UNIVERSITY OF ALBERTA

THE CONSTRUCT VALIDITY OF THE FUNCTIONAL AUTONOMY MEASUREMENT SYSTEM (SMAF) FOR THE OLDER ADULT ON HOME CARE

BY

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled **The Construct Validity of the Functional Autonomy Measurement System (SMAF) for the Older Adult on Home Care** in partial fulfillment of the requirements for the degree of Master of Science

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Dr. Peter McCracken

December 16, 1998

DEDICATION

This body of work is dedicated to Harry, Megan and Steven Elliott.

Abstract

The validity of the Functional Autonomy Measurement System (SMAF) was evaluated for the elderly on Home Care by examining its relationship to the Barthel Index (BI), the Timed Up & Go (TUG) and the Berg Balance Scale (BBS). The ability of the Disability SMAF and paid resources to predict the Handicap was also examined.

Subjects were volunteers (n = 36, 62 - 92 years) from a Home Care Rehabilitation program. The SMAF was administered by one rater and the BI, TUG and the BBS by another rater during a subsequent interview.

Spearman Rho and Pearson revealed that the SMAF was significantly related to the BI and TUG but not to the BBS. Disability SMAF and paid formal services were poor predictors of the Handicap SMAF.

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CHAPTER ONE

THE PROBLEM

Introduction

Functional performance measures of the elderly have become an integral part of rehabilitation research and clinical practice. Functional performance is defined as the observation, interpretation and documentation of the functional status of an individual[1] i.e. his/her ability to complete everyday tasks required within the context of his/her environment. Measures of basic self-care (dressing, transferring, toiletting, bathing, eating) are referred to as Activities of Daily Living (ADL) whereas those measures that extend beyond the body, examining the interaction between the individual and the environment (cleaning, shopping, banking), are known as Instrumental Activities of Daily Living (IADL).[2] Poor functional performance in the elderly is associated with a longer length of hospital stay[1], risk of institutionalization[3], mortality[4], comorbidity[5], poor physical abilities[3,6-8], decreased self-efficacy[9] and a non-supportive social support structure.[10]

Many functional performance scales used to measure abilities of older adults were either originally designed for the hospitalized elderly or for specialized populations (eg. the Barthel Index for the neurological patient).[11] When these measures were applied to the community-dwelling elderly receiving rehabilitation, there was inadequate relevant content, an observed ceiling effect and poor responsiveness to observed changes in ability.[12,13] These scales were restricted to the measurement of ADL and indoor mobility, functions of more relevance to a population in an acute care setting.

The addition of IADL to ADL scales increases the sensitivity of functional performance measures for the elderly. Independence in IADL activities has differentiated between individuals that could maintain independent community-living and those at risk for institutionalization.[14] Furner (1995) noted that a decline in health status affected IADL before ADL.[5] The loss of IADL effectively restricted physical living space and served to reflect a change in mobility status.[14]

The Functional Autonomy Measurement System (SMAF) is a scale with potential value in the measurement of the community-dwelling elderly. Originally designed to evaluate the care needs of the geriatric client in any health care setting[15,16], the scale includes the examination of ADL and IADL performance. The SMAF evaluates an individual's limitations in performance (disability), the resources available in the environment to assist with the activity being evaluated (type and stability), and the subsequent effect of the resources on the observed disability (handicap).

Psychometric testing of the scale has been limited. The SMAF has demonstrated good test-retest and inter-rater reliability.[15,16] Validity studies of the instrument have had limitations. In two studies[13,15], the elderly were located in institutions (long term care, acute hospital ward). The researchers omitted questions deemed irrelevant for the setting and in one, redefined an ADL category. One study on the community-dwelling elderly validated a newly designed postal questionnaire on health risk using the SMAF as a criterion measure.[17] The SMAF has not been validated against accepted rehabilitation measures.

Purpose of the Study

The purpose of this study was to examine the construct validity of the SMAF in the measurement of elderly patients receiving home care services because of compromised health. Construct validity was evaluated by examining its correlation to variables where a relationship would be anticipated.

The specific hypotheses were:

1. There is a positive correlation between the SMAF Disability Index (SMAF D) and the Barthel Index (BI), a validated disability measure of ADL/mobility ($r \geq 0.50$).
2. There is a negative correlation between the SMAF D and the time taken to complete the Timed Up & Go (TUG), a physical measure of mobility ($r \geq 0.50$).
3. There is a positive correlation between the SMAF D and the Berg Balance Scale (BBS), a physical measure of balance ($r \geq 0.50$).
4. The SMAF Handicap Index (SMAF H) will be predicted from the SMAF D and the hours of paid formal service provided through home care (homemaking and personal care).

Delimitations

This study was delimited to:

1. The measurement of the elderly on Home Care receiving rehabilitation in Southwest Edmonton.
2. The definition of functional performance in the SMAF.
3. The selection of measurement tools (BI, TUG and BBS) to validate the SMAF.

Limitations

This study was limited by the following:

1. The ability of the subjects to fully understand the questions and tasks that were asked of them.
2. The stability of the subject's medical conditions as reflected in stable functional performance between test situations.
3. The consistency with which the raters applied the measurement instruments.

Definitions

Activities of Daily Living: are activities of basic self care.[1] These usually encompass bathing, washing, grooming, dressing, eating, transfers, and toiletting.

Construct Validity: is the degree to which an instrument measures the theoretical concept on which it is based.[18]

Disability: is the lack of ability to complete a defined task.[19] The execution of these practical, everyday tasks is called functional performance. Functional performance is measured using a disability scale.

Elderly: denotes a group of adults over 60 years. For the purposes of this study, the use of this term implies a state of compromised health.

Functional Performance: is the execution of practical everyday activities. These activities are utilitarian and purposeful.

Handicap: is the disadvantage resulting from a disability that limits or prevents normal role fulfillment given the individual's age, gender, social and cultural context.[20]

Instrumental Activities of Daily Living: are those activities that relate to one's interaction with the environment.[21,22] They have been described as more complex than ADL and necessary for independent functioning in the environment.[23] The types of activities listed in this category are dependent on the scale. Shopping, banking, transportation use, driving, cleaning and medication management are specific task examples.

Performance: is used to describe the act of doing or completing a specified task.

Physical Performance: in this study, is used to denote the actual completion and measurement of specific movement parameters. Measures typically used with the elderly are strength, time taken to complete a defined task, gait velocity and balance.[1,2,6,8,24,25]

Resources: may refer to personnel or equipment that is available within one's environment and allows successful task completion if used.

Abbreviations

ADL: Activities of Daily Living

BBS: Berg Balance Scale

BI: Barthel Index

IADL: Instrumental Activities of Daily Living

ICIDH: International Classification of Impairment, Disability and Handicap

SMAF: Functional Autonomy Measurement System

SMAF D: Functional Autonomy Measurement System Disability Index

SMAF H: Functional Autonomy Measurement System Handicap Index

TUG: Timed Up & Go

WHO: World Health Organization

CHAPTER TWO

REVIEW OF THE LITERATURE

Overview

This review will provide background on disability and its measurement in the elderly. The incidence of disability in the elderly, factors affecting the reported rate and the importance of its measurement for this age group will be discussed. Recent research linking disability and physical performance will be summarized. Finally current published research on the SMAF will be analyzed.

Disability Incidence and Factors Affecting the Reported Rate

Several epidemiological studies have examined the characteristics of the community-dwelling elderly, recording relevant social and medical history, activity patterns and reported functional performance (disability).[4,26-29] As people age, they have more chronic disease and comorbidity.[26,27] Several studies have reported an incidence of disability of less than 10% (5-7.8%) before the age of 80 but a rapid increase thereafter.[4,26,27,30,31] A greater incidence of disability in females has also been reported.[4,26,31,32]

The characteristics and the situations of the elderly can affect the reported rate of disability. It has been reported that the elderly with more than one medical diagnosis[27], declining cognitive function[8] and poor physical abilities[30,33] have more disability. Older adults with chronic disease especially cerebrovascular disease and arthritis have more functional limitations[34]. Readily available informal support[9,29] has

not always been associated with less disability. In one study (n = 1189) males with higher informal support developed more disability over time. A poor belief in one's ability to successfully perform tasks (self-efficacy) was associated with increased incidence of disability over time.[35]

The reports of disability are also affected by the characteristics of the measurement tool used. In several large prospective American population studies[36], the rate of disability was dependent on the type and number of activities measured. Those studies with more comprehensive ADL lists had higher disability rates. If mobility[36] and/or IADL[2,4,14] were also included, the detection of disability increased.

Incidence may vary as a result of different response categories and their interpretation by the participants. In some studies human assistance, need for cueing, use of equipment and need for supervision are levels of disability whereas in others only the need for human assistance is recognized as a level.[36]

Measurement of Disability in the Elderly

Disability in the elderly is related to poor health and an increased risk of health service use[29], institutionalization[31] and death.[3,4] Thus its early detection may identify service need and be used to determine appropriate intervention.[37]

Disability is measured by self-report or observation of performance. Theoretically, actual performance measurement is thought to be superior to self-report as it is objective, quantifiable, reproducible, sensitive to change and influenced less by cognition, culture and education.[38] However, a recent study of community-dwelling older adults (n = 99, 60-92 years of age)[39] found that subjects preferred the

questionnaire to performance assessment, finding it less tiresome and easier to complete.

Agreement between self-evaluation and actual performance in the elderly has varied.[39-42] In one study the estimated degree of difficulty recorded by an independent rater was lower than that reported by the person completing the functional task.[39] Other studies have found that individuals underestimate their abilities.[39,40] However there is a strong relationship between self-rated function and concurrent ability to complete functional tasks.[41] The strength of the agreement between the two increases if both examine the same task.[28,41]

The second consideration in disability measurement is variability in functional performance over time. Research has reported stability in functional performance of the community-dwelling elderly when measures are applied 2-6 weeks apart. Measures of ADL (Katz) and physical performance (Rosow-Breslau, Nagi) were administered three weeks apart with very good agreement between measurement periods.[43] Test-retest reliability of the Functional Independence Measure and the IADL scale (Multidimensional Functional Assessment of Older Adults) when applied 4-6 weeks apart was excellent with ICCs ranging from .91 - .96.[44] This suggested that the functional status of these community-dwelling elderly did not vary significantly between rating sessions.

Many present scales measure predominantly ADL and do not identify early loss of functional ability.[12,16,37,45-47] Evaluation of IADL identifies early dysfunction and service needs facilitating intervention.[1,16,22,48] Two other risk factors identified for future functional loss are cognitive decline and mobility impairment.[3,6-8,32,49] Both

cognition and physical performance levels are independent predictors of future disability.[8] Current mobility status is related to disability [2,24,32,50,51] Many studies use multiple standardized measures to evaluate these factors lacking a simple comprehensive clinical measure.[8,20,21]

The Relationship Between Disability and Physical Performance Measures in the Elderly

The existence of a relationship between disability and physical performance measures has been examined in previous research.[3,6,7,33] Physical impairments at specific body sites have predicted changes observed in both ADL and IADL abilities.[33,49] Lower extremity impairment has been associated with increasing disability in IADL.[33]

Judge (1996) demonstrated that performance of older adults on simple physical performance measures (balance, chair-rise time and gait velocity) was related to their IADL ability.[49] Chair-rise time and gait velocity were independent predictors of future ADL dependency.[3,6] Combined measures of functional performance and physical abilities have discriminated between individuals in differing residences[27,33], predicted mortality[7], and identified those at risk for future institutionalization.[6,7] The relationship between standardized physical performance measures and the SMAF has yet to be evaluated.

The Functional Autonomy Measurement System

The SMAF was designed to assess the need for, and allocation of, community services, and to identify the level of supported residence required by an individual (eg. a lodge, nursing home, or auxillary bed).[16] The tool originated out of the necessity for a single instrument able to evaluate care requirements of the geriatric client in a variety of contexts (acute care, home health, chronic care).

The scale was based on the International Classification of Impairment, Disability and Handicap (ICIDH) model adopted by the World Health Organization (WHO).[19] Disability is defined as the restriction or lack of ability to perform an activity in a normal manner. Handicap is the social disadvantage conferred on an individual as a result of disability, the environmental demands and available resources.

The items chosen for inclusion in the scale cover fundamental areas of function that are closely related to defined disability categories within the WHO classification; personal, dexterity, locomotor, behaviour and lastly, body disposition.[16] A literature review of previous IADL measurement scales identified the items important to evaluate with respect to the community-dwelling elderly.[16] This same process was used to ascertain the evaluation criteria for each function.

The SMAF (Appendix E) consists of 29 questions evaluating the areas of ADL (7), IADL (8), Mobility (6), Communication (3) and Mental Function (5). These 5 subscales have not been validated independently. Each question in the SMAF is assessed according to a four-level scale ranging from complete independence (0) to dependence (-3). The SMAF is administered as a questionnaire to the client, a family member or caregiver. The length of time to administer it is estimated at 40 minutes.

Note is made of the resources available to compensate for a disability. These resources have the potential to modify the scoring of disability reducing its impact to negligible (0). If the appropriate resources are not available, the disability score is transferred to the handicap section without modification. The resulting total varies from 0 (no handicap) to -87 (maximum handicap). A low number reflects poor ability and high handicap indicating the need for support services.

If current environmental resources are used to assist with task completion, questions are asked to determine whether these resources will be present at the same level in the near future. If a change in their availability is anticipated, the interviewer is signalled to explore alternate resources. Options such as home care, private help and/or the use of other family members may be evaluated with the client and/or caregiver.

Initial scoring levels were modified based on clinician's input.[15] An intermediate level of - 0.5 was introduced to items in the ADL, mobility and IADL sections. For items examining wheelchair and prosthetic/orthotic use, the intermediate level was given the value of - 1.5. These levels described the subject who completed a task independently but with difficulty. This acknowledged the qualitative nature of independence and that its achievement may involve a higher energy cost for some individuals. The modification was considered essential in the planning of rehabilitation intervention.

Initial psychometric testing of the original SMAF examined inter-rater reliability.[16] Raters were paired from different professions (nursing and social work) and settings (community and institutions). Each pair agreed on the rating of 75% of the items in the

scale. The poorest rates of agreement were observed for those activities subsumed under the categories of communication and mental function.

Reliability of the modified scale was studied with elderly from a broad range of residential settings (home to institution).[15] Test-retest and inter-rater reliability were examined with nurses as the raters. The scale demonstrated good consistency over time (ICC = 0.95) and a high degree of inter-rater reliability (ICC = 0.96). The same nurse completed both interviews for the test-retest reliability. Thus, the SMAF also demonstrated good intra-rater reliability.

Specific guidelines for the SMAF measurement levels have not been provided. The scale is meant to be self-explanatory with no formal training of the rater required prior to its application. The high inter-rater reliability suggests that the lack of a manual has not created any rater confusion. Reliability testing of the modified scale has not been completed with raters from the rehabilitation professions, occupational and physical therapy.

Further validity testing of the SMAF is needed. Concurrent validity has been examined by relating the SMAF Disability score to a validated instrument of nursing care (not named in the literature) for residents occupying chronic care beds [16]. There was a moderate relationship demonstrated between these two measures ($r = 0.58$-0.89, $p<.0001$). The SMAF was able to discriminate among residents living in supported settings with differing levels of care. However, as the clients were long-term care residents, IADL and walking outside were not measured. It is not known whether similar correlations would be found with the SMAF tool as a whole.

The scale has been used in a study that examined its ability to detect change with rehabilitation. Rehabilitation was not operationally defined. Patients hospitalized on a geriatric unit were measured by a nurse, on admission and every two weeks until discharge.[13] Pre-discharge scores demonstrated a significant change from admission scores for ADL, Communication and Mental Function. Once again, the SMAF was not used as designed. The IADL subscale and walking outside were deleted because the subjects were in hospital. Dressing was also modified with the upper and lower half of the body recorded separately.

These study designs reflect the difficulty that exists with the scale for the hospitalized/institutionalized elderly suggesting that the SMAF may be more relevant for the community-dwelling elderly. Omitting IADL and outdoor mobility invalidates the intent of the original scale, ie. a single instrument that evaluates the older adult across all healthcare settings.

The SMAF was indirectly validated in a study that examined whether the response to a postal questionnaire could predict those older adults at risk for functional decline.[17] Elderly residents living in a community (n = 607) were mailed a questionnaire that examined demographics, general health and function. Following their response to the questionnaire, these same residents received a home interview during which the SMAF was administered. A repeat SMAF occurred 1 year later. From those participants identified as at risk for functional decline, 38% had a SMAF score change ≥ 5 (mean SMAF = -13.47, sd = 11.32).

Validating a measure is the ongoing process of accumulating evidence that a measure is what it claims to be.[18,52] The greater the variety of evidence that one

collects, the greater the confidence one can have in that measure.[18,53,54] The SMAF has had only one study that specifically addressed validity through its relationship to a nursing time scale. Thus further evidence is required before one can feel confident in its validity.

Construct validity is the ability of a measure to reflect the theoretical context on which it is based.[18,54] Because of its abstract nature, construct validity is difficult to demonstrate. One way is to explore the correlation of the measure with variables where a relationship would be anticipated.[18,52,54] If it conforms to prior anticipated relationships among its theoretical characteristics, then the instrument is said to have construct validity.[53,54] Thus the SMAF as a functional performance scale should demonstrate a relationship to measures of disability and physical performance.

Summary of the Literature

The SMAF is a functional measurement scale that examines both the geriatric client's actual performance (disability) and subsequent handicap based on the resources available in one's environment. It appears to measure tasks that have been subsumed in other ADL/IADL disability scales. The SMAF's relationship to existing ADL/IADL scales has not been evaluated. The scale has not been correlated to existing standardized measures of physical function. The relationship of the SMAF handicap score and the provision of formal resources in the community-dwelling elderly has yet to be evaluated. Validity testing of this tool remains an area of needed research.

CHAPTER THREE

METHODS

Research Design

This was a descriptive correlational study validating the use of the SMAF in the measurement of the community-dwelling elderly on Home Care.

Subjects

Subjects were volunteers recruited from the caseloads of Home Care Rehabilitation staff in the Southwest district of Capital Health Home Care, Edmonton, Alberta. The sample size of 36 was determined using the correlation tables for sample size based on a one-tailed test at an alpha level of .01, an r = .50 and a power of 0.80 (Appendix A).[55] There were no dropouts. Two subjects that were approached refused to participate. Reasons cited were lack of interest and fatigue. The characteristics of the two subjects did not vary from those of the sample.

Subjects were recruited from the Long Term Care (LTC) and the Short Term Intervention and Treatment (STIT) programs. Program classification was based on the predicted length of care. LTC clients were anticipated to be on Home Care greater than 120 days and those on STIT less than 120 days. Both programs were included to allow for a broad range of subject characteristics.

Subject Criteria

Subjects admitted to the study satisfied the following inclusion criteria:

1. Age was greater than 60 years.
2. Subjects were able to give informed consent (Appendix B) as determined by their comprehension of the study's objectives at the initial interview. One blind subject was unable to sign the form. The subject gave verbal consent. The son as per the subject's request then signed the consent form.
3. Subjects were able to speak English.
4. Subjects were able to understand verbal or nonverbal instructions.

The exclusion criteria were:

1. None of the subjects was admitted to the Palliative Home Care program.
2. None of the subjects had a primary psychiatric diagnosis. Persons with dementia participated as long as they met inclusion criteria 4.

Data Collection

Data collection occurred over four months from February to June 1998. Rehabilitation staff identified their LTC/STIT clients who satisfied the study's inclusion and exclusion criteria. The staff asked clients if they would be willing to be phoned by another Home Care employee (the primary investigator) regarding possible participation in this study. If these subjects answered yes, the primary investigator phoned within one week to book the initial interview. The described procedure is a modification of the initial selection procedure where clerical staff would identify 12 subjects per week that satisfied the inclusion/exclusion criteria. Information letters would be left with the assigned case managers of these clients. The case managers would ask these clients if they would be willing to be phoned by another Home Care

employee (the primary investigator) regarding possible participation in this study. If these subjects answered in the affirmative, the introductory letter was to be left with them to be read (Appendix C). Modification was found to be necessary as Home Care staff were not consistently giving the introductory letter to potential participants. Hence, at initial telephone contact, comprehension for the possible study participants was difficult.

All assessments occurred in the client's home. During the initial visit the primary investigator reviewed the introductory letter (Appendix C), explained the purpose of the study, answered any questions and obtained informed consent (Appendix B). Initial diagnostic and demographic data were collected (Appendix D) and the SMAF (Appendix E) was completed. The interview concluded with the collection of existing activity levels and walking aid use. Participants were informed that a second rater would contact them to establish the second interview time.

The second rater (physical therapist) contacted the subjects within one week to book an assessment appointment. This rater was blinded to the program admission status of the client (LTC/STIT). During the assessment, the BI (Appendix F), TUG (Appendix G) and BBS (Appendix H) were completed in that order. The results obtained were passed on to the primary investigator to allow for data entry. Prior to entering data, the primary investigator accessed the case manager and the Home Care file to verify any medical information that had been collected in the interviews. The results were not discussed between the raters. This research study did not delay usual admission assessments (Adult Functional Assessment Tool, PT/OT Data Base) and the initiation or continuation of rehabilitation intervention.

Both raters were trained in their respective tools prior to the study. The primary investigator became independently familiar with the SMAF scale. The second rater was trained by the primary investigator in the standardized administration of the BI, TUG and BBS. During the interview the raters used the person's reported abilities and their clinical judgment, based on professional knowledge and observation, to rate the item.

Intra-rater reliability for the raters was established prior to the initiation of the study. A set of repeated measures occurred within 5 days on 10 clients (Appendix I). Reliability for the measures used was acceptable meeting the recommended criteria of an ICC ≥ .90 for clinical trials (Table 3.1 & Appendix I).[18] There was a lack of variability in the SMAF Handicap data. Thus intra-rater reliability for the Handicap Scale was determined by examining the mean difference between scores and the standard error of measurement. The absolute mean difference between scores was less than the pre-established criteria of 2 and the standard error of measurement was .92. Reliability was considered good (Appendix I).

Table 3.1 Intraclass Correlation Coefficients (ICC) of the Outcome Measures

Outcome Measure	ICC	SEM
SMAF Disability Measure	.93	2.10
Barthel Index	.90	1.86
Berg Balance Scale	.91	3.77
Timed Up and Go	.95	2.45

Measurement Instrumentation

Functional Autonomy Measurement System (SMAF)

The SMAF (Appendix E) was administered through an interview process. Each question was read to the subjects who described how they completed the specific functional task. The interviewer selected the most appropriate rating level from the choices given. The interviewer sought clarification when necessary by asking the person specific questions related to the choice of rating. The stability and type of resources used by the person were next examined with a note made on the assessment form. The subjects were then asked whether these resources modified the disability rating reducing its impact to negligible. Note was made of the total disability and handicap scores as well as the disability scores for each subscale: ADL, mobility, communication, mental function and IADL.

Barthel Index (BI)

The BI (Appendix F) is a disability scale that measures functional performance in ADL and mobility.[11] The items included in the scale were selected because of their relevance to the level of nursing care required. The BI has been used and validated in rehabilitation as a method of estimating prognosis, evaluating progress, and predicting length of stay and eventual discharge location.[11]

Several versions of the BI exist.[11] For the purposes of this study, the 10 item Modified BI with weighted scoring, five levels of rating per item and a potential total of 100 was used[56] (Appendix G). The weighted scoring for each item reflects its relative importance in terms of nursing care and social acceptance. The increased levels of rating were introduced to allow for accurate reflection of the amount and

type of assistance provided. Internal consistency of the 10-item revised scoring scale is excellent (0.90 to 0.93).[56] Test-retest reliability of .89 has been reported.[11] Inter-rater reliability has been reported as either a correlation of .99 or a Cronbach's Alpha of .98.[11]

Critical values for the BI have been established for discharge locations.[57] Individuals with a total score ≥60 are more likely to be successfully discharged home. The BI is accepted as a reliable, valid measure of function of the elderly across all health care settings demonstrating both discriminative and predictive validity.[11] The BI was selected as the disability scale to relate to the SMAF D because some similar functional tasks are measured and it had been used with the elderly.

The BI was the first measurement administered during the second interview. Each question was read to the subjects who described how they completed the task. The interviewer selected the most appropriate rating level from the choices given. The interviewer sought clarification when necessary by asking the person specific questions related to the choice of rating.

The Timed Up & Go (TUG)

The TUG is a measure of mobility in the elderly.[24] (Appendix G). The time it takes an individual to stand up from a standard height chair with arms, walk 3 meters, turn, walk back to the chair and sit down, is measured. Individuals wear their regular walking shoes, use their usual walking aid and are instructed to walk at their normal pace. Intra-rater and inter-rater reliability are high with ICCs of 0.99 for both.[24] Normal healthy community-dwelling elderly < 79 years of age completed the task in 10 seconds.[24,25] Clients attending a day-hospital program (n = 60, mean age of 79.5

years) completed the 3 meter course in 10 to 240 seconds.[24] The TUG is correlated with the BI (r = -0.51), the BBS (r = -0.81) and measures of gait velocity (r = -0.55).[24,25]

Past studies have demonstrated that gait velocity and functional performance are related.[1-3,6,7] The TUG incorporates a measure of the time taken to walk a set distance (3 meters) with chair rise time. Thus it was anticipated that the TUG and the SMAF would demonstrate some degree of relationship. The TUG requires minimal space to complete the task. Thus the test is appropriate in confined home environments.

The TUG was administered following the BI. It was administered before the BBS in case fatigue affected the time it took to complete the 3 meter course. The rater asked the subjects to first listen to the instructions then observe her as she completed the course. The subjects were instructed to start when the rater said go, to stand up from the chair, walk at their usual pace to the 3 meter marker, turn, return to the chair, and sit down. The rater started the timer from the moment she said go and stopped the timer once the subject had sat down. The total time in seconds was recorded.

Berg Balance Scale (BBS)

The BBS is a measure of balance developed for older adults[58] (Appendix H). It examines performance on 14 items that increase in complexity and skill demand. Each item is graded on a 5 point scale from unable to do the task (0) to completely safe and independent in performance (5). The BBS has demonstrated high reliability with both intra- and inter-rater ICCs at 0.98.[59] Performance in the BBS is moderately

correlated to spontaneous postural sway (r = .55).[50] The BBS is correlated to the TUG (r = -0.72 to.-0.76), the Tinetti Balance Sub-Scale (r = 0.91) and the BI (r = 0.67 -0.93).[50,60] Previous research has demonstrated that good balance is related to better functional performance and a decreased risk for institutionalization.[1-3,6,7] Thus the SMAF Disability score should be related to a measure of balance, the BBS.

The BBS was the last tool administered. The participant was asked to listen to the instructions for a specific task and then do it when the rater indicated a start time. The rater was allowed to demonstrate a task once if the subject was unsure of the directions. The rater selected the closest level of performance for each task. Where a subject's performance crossed the boundaries of more than one rating level, the rater selected the lowest level. Rests were given to the subject as required. Subjects were told they could stop the test if they felt unable to complete it.

Data Analysis

Descriptive analysis of data included the calculation of means, standard error and standard deviation for each outcome measure and appropriate subject characteristic. Frequency statistics were recorded for the program, gender, diagnosis type, residence, who the client lived with, the client's recent activity levels, and the type and frequency of use of walking aid.

Pearson's Product Moment Correlation coefficients and Spearman's rho were calculated to determine the relationship between the SMAF D and the BI, BBS and TUG. A one-tailed test was chosen as the hypotheses stated were directional. The alpha level of .01 was selected because one measure, SMAF, was correlated to three

separate measures, the BI, BBS and the TUG. The value was determined by dividing the p value of .05 by 3, the number of correlations (05/3 = .16). If the alpha level was left at .05, the chance of making a Type I error would be greater than .05. The underlying assumptions of normal distribution were tested for the data collected.

A forced regression analysis was calculated to determine the extent that the SMAF D score + hours of paid resources predicted the SMAF H score. All data were analyzed using the SPSS statistical package.[61]

Ethical Considerations

This study was approved by the Health Research Ethics Board of Capital Health Authority (Appendix J). Consent was received from Capital Health Home Care Management (Appendix K). Permission to use the SMAF scale in the measurement of the community-dwelling elderly on Home Care was obtained from Dr. Hebert (Appendix L).

Informed consent (Appendix B) was obtained from the subjects prior to their enrollment in the study. Any risk to the subject was minimal and did not represent an increase from the risk assumed with the usual assessment procedures. However, it was recognized that the collection of these data was an "extra" for the client, involving an additional time commitment. Clients were informed of their right to withdraw from the study at any time without consequence to their service provision.

CHAPTER FOUR

RESULTS

Subject Characteristics

Characteristics of the study sample are listed in Table 4.1. The study sample was compared to two samples selected systematically from the Edmonton Home Care population (Table 4.1). The first population sample listed was taken from all new LTC and STIT admissions (N = 13,941) from February to June 1998. The second population sample was taken from all current LTC and STIT admissions (N = 13,489) as of June 1, 1998. The population sample subjects were every N/36th one. Systematic sampling is an acceptable scientific technique resulting in samples that differ minimally from a random sample and is considered potentially more precise.[62,63]

The study sample characteristics were evaluated for their representation of the Home Care population. An ANOVA analysis of age and paid service use, and chi-square analysis of all other demographics revealed minimal differences among the three groups (Appendix N). The study sample varied from the others only with respect to the incidence of diabetes and of cardiovascular conditions. Medical diagnoses are listed for each group but comorbid conditions were consistently available for the study sample only. Residential type and living arrangements were similar in all three groups (Table 4.1). Most of the subjects lived in a private home, and a little greater than 50% lived alone. The mean age and hours of service provision in the sample were similar to the values recorded for the current Capital Health Home Care population. The majority of the study subjects used some form of a walking aid

(Table 4.2). However their activity level was high with ≥ 66% having travelled outside of their neighbourhood to shop, visit or attend a medical appointment in the previous week.

The Relationship of the SMAF to the BI, TUG and BBS

The average length of time between rating by the two assessors was 17.69 ± 15.62 days. Raw data collected are listed in Appendix M. Descriptive statistics for the outcome measures of interest are listed in Table 4.3. The underlying assumption of normal distribution for each outcome measure in the study was evaluated by three methods. Tests of skewness, kurtosis and the results of a one-sample Kolmogorov-Smirnov test are listed in Table 4.4. The one-sample Kolmogorov-Smirnov test indicates whether the observed values come from a normal distribution.[61] Histograms of each outcome measure follow (Figures 4.1 - 4.6). The normal distribution curve has been superimposed on each graph.

Both the SMAF Handicap Scale and paid formal resources were skewed. Significant Kolmogorov-Smirnov statistics indicated that the assumption of normal distribution was not met. This statistic was borderline for the TUG. However the TUG histogram (Figure 4.5) approximated a normal distribution.

Table 4.1 Demographics of the Study Sample & the Capital Health Home Care Population - Number (Percentage)

	Southwest Study Sample	Capital Health Home Care Population - New	Capital Health Home Care Population - All
Number	36 (100)	36 (.3)	36 (.3)
Age (mean yrs.±sd)	79.89 ± 7.85	83.83±9.57	80.32±9.47.
Gender			
Females	29 (80.6)	20 (55.6)	25 (69.4)
Males	7 (19.4)	16 (44.1)	11 (30.6)
Program			
LTC	25 (69.4)	30 (83.3)	30 (83.3)
STIT	11 (30.6)	6 (16.7)	6 (16.7)
Diagnosis			
Cardiovascular*	24 (66.7)	11 (30.6)	8 (22.2)
Muskuloskeletal	27 (75.0)	18 (50.0)	17 (47.2)
Pulmonary	8 (22.2)	6 (16.7)	4 (11.1)
Diabetes*	8 (22.2)	4 (11.1)	1 (2.8)
Cancer	3 (8.3)	2 (5.6)	4 (11.1)
Neurological	14 (38.9)	11 (30.6)	8 (22.2)

* Study sample significantly different from the population samples.

Table 4.1 (Continued) Demographics of the Study Sample & the Capital Health Home Care Population - Number (Percentage)

	Southwest Study Sample	Capital Health Home Care Population -New	Capital Health Home Care Population - All
Residential Type			
Private	24 (66.7)	24 (66.7)	28 (77.8)
Sr. Housing	7 (19.4)	11 (30.6)	7 (16.7)
Lodge	5 (13.9)	1 (2.8)	1 (2.8)
With			
Lives Alone	19 (52.8)	20 (55.6)	23 (63.9)
Spouse	11 (30.6)	11 (30.6)	8 (22.2)
Spouse & Other	2 (5.6)	--	1 (2.8)
Group Setting	4 (11.1)	4 (11.1)	4 (11.1)
Child	--	1 (2.8)	--
Paid Service (hours/week)	3.19 ± 3.79	1.97±2.39	2.99±4.35

Table 4.2 Mobility Pattern and Recent Activity Level of the Study Subjects

Mobility Patterns	Number (Percentage)
Recent Activity Levels	
Homebound	4 (11.1)
Has been outside of home	8 (22.2)
Has left the neighbourhood	24 (66.7)
Type of Walking Aid Used	
None	3 (8.3)
Cane	12 (33.3)
Quad cane	2 (5.6)
Standard walker	1 (2.8)
Wheeled walker (2 & 4)	16 (44.4)
Crutches	2 (5.6)
Pattern of Walking Aid Use	
Constant use indoors	12 (33.3)
Intermittent use indoors	19 (52.8)
For distance walking outdoors	13 (36.1)

Table 4.3 Descriptive Statistics of the Outcome Measures Used In the Validation of the SMAF

Outcome Measure	Mean	Std. Error	Standard Deviation
SMAF D	-22.85	1.33	7.99
SMAF H	- 0.72	.25	1.49
BI	87.64	1.29	7.76
BBS	33.75	1.60	9.61
TUG (seconds)	28.41	2.06	12.36
Paid Formal Service (hours/week)	3.12	.63	3.79

Table 4.4 Evaluation of the Sample Distribution

(bold for those values that indicate the distribution is not normal)

Outcome Measure	Kurtosis	Skewness	Kolmogorov-Smirnov (p-value)
SMAF D	- .55	.21	.13 (.13)
SMAF H	4.20	-2.17	**.44 (.00)**
BI	- .65	- .10	.08 (.20)
BBS	.47	- .20	.10 (.20)
TUG	.44	.99	**.15 (.05)**
Paid Service	.82	1.23	**.21 (.00)**

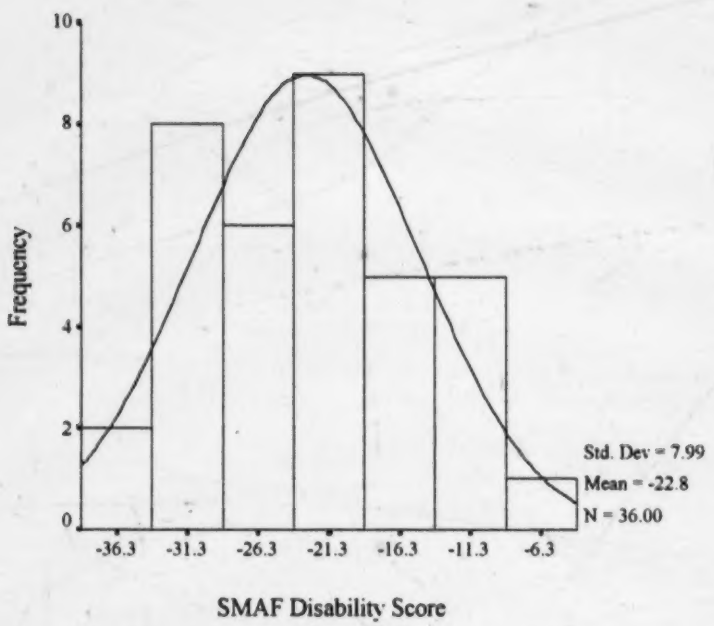

Figure 4.1 Histogram of the SMAF D

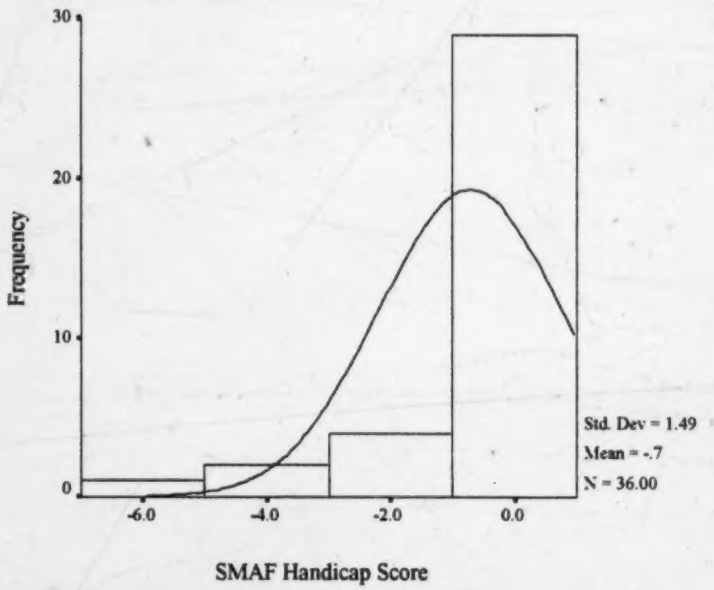

Figure 4.2 Histogram of the SMAF Handicap Scale

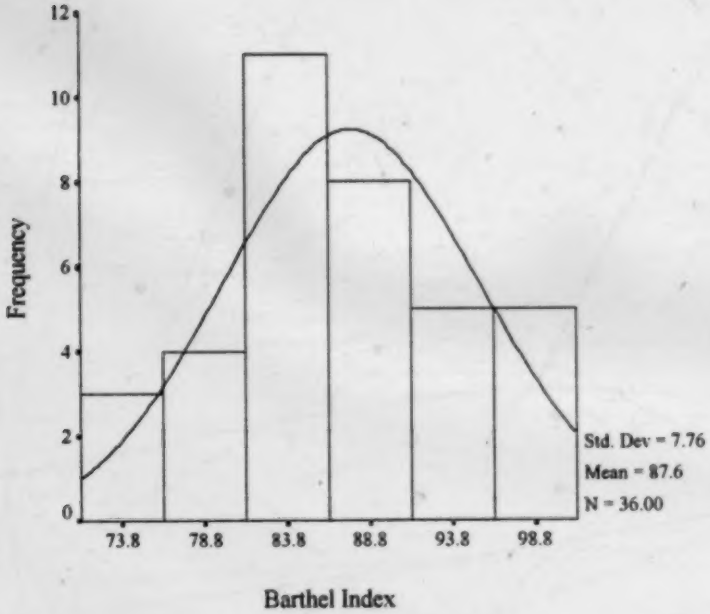

Figure 4.3 Histogram of the Barthel Index

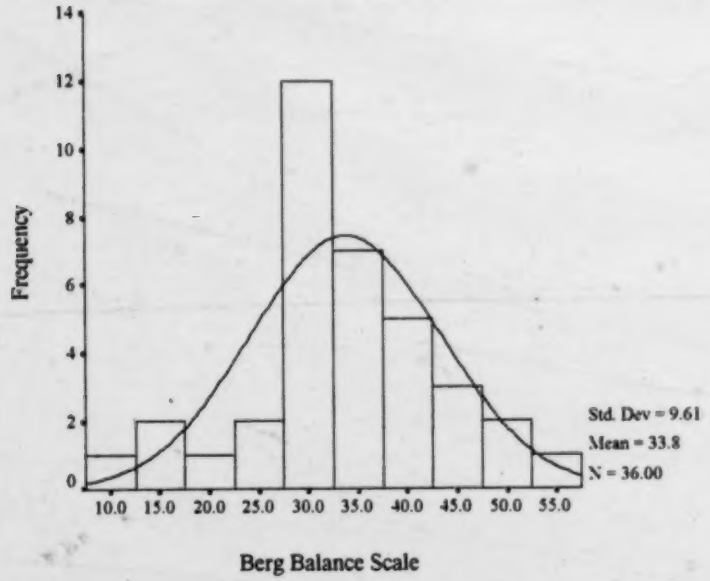

Figure 4.4 Histogram of the Berg Balance Scale

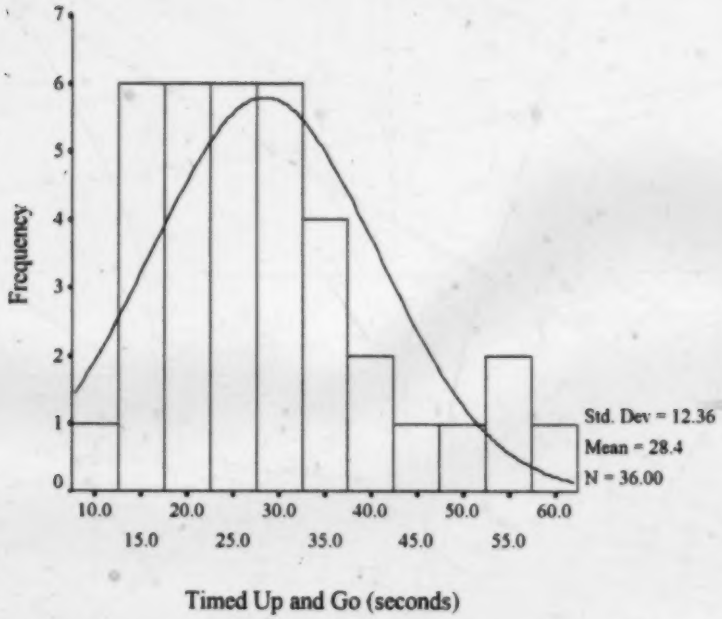

Figure 4.5 Histogram of the Timed Up and Go

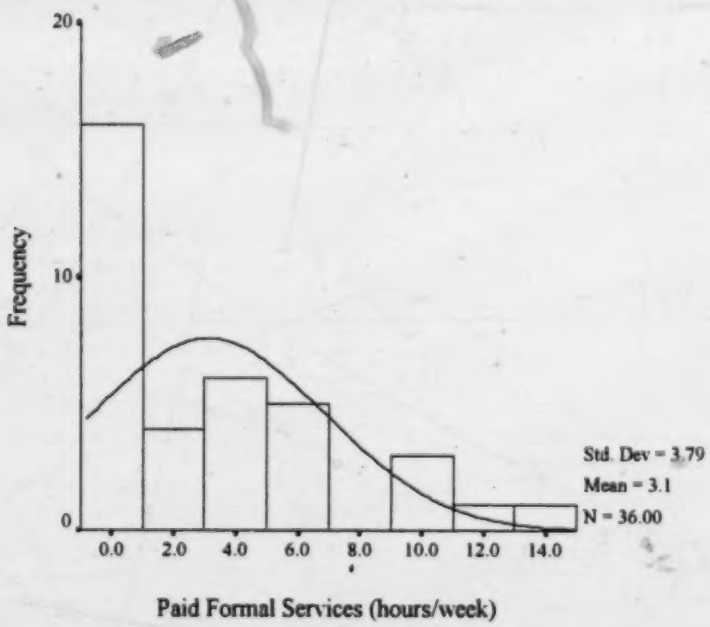

Figure 4.6 Histogram of the Paid Formal Services

The Pearson's correlation coefficients for the outcome measures are recorded in Table 4.5 followed by their Spearman's rho correlation coefficients in Table 4.6. Pearson's Product Moment correlation coefficients assume that the sample data approximates a normal distribution and that the level of measurement is either interval (with equal distance between levels) or ratio. Although the graphs suggested normal distributions for the SMAF D, BI, BBS, their levels of measurement are technically ordinal, not interval. Therefore Spearman's rho correlation coefficients were also calculated. The strength and the significance of the correlations between the SMAF D and the scales of interest were similar with both statistics. The SMAF D was significantly correlated to the BI and the TUG but not to the BBS. Correlations were low to moderate. These relationships are illustrated in figures 4.7-4.9.

Table 4.5 Pearson's Correlation Coefficients for the Outcome Measures Used in Validation of the SMAF (Bold for $p \leq .01$ level, 1-tailed; actual p-value follows in brackets)

Measure	SMAF H	BI	BBS	TUG	Paid Ser.
SMAF D	.17 (.17)	**.49** **(.00)**	.36 (.02)	**-.39** **(.01)**	-.15 (.20)
SMAF H		-.13 (.23)	-.21 (.12)	.10 (.28)	-.16 (.18)
BI			**.66** **(.00)**	**-.59** **(.00)**	-.25 (.07)
BBS				**-.59** **(.00)**	-.07 (.34)
TUG					.10 (.29)

Table 4.6 Spearman's Rho Correlation Coefficients for the Outcome Measures Used in Validation of the SMAF (Bold for p ≤ .01 level, 1-tailed; actual p-value follows in brackets)

Outcome Measure	SMAF H	BI	BBS	TUG	Paid Service
SMAF D	.23	**.43**	.28	**-.42**	-.21
	(.09)	**(.01)**	(.05)	**(.01)**	(.11)
SMAF H		-.04	-.17	.02	-.27
		(.40)	(.16)	(.45)	(.06)
BI			**.63**	**-.64**	-.39
			(.00)	**(.00)**	(.01)
BBS				**-.54**	-.20
				(.00)	(.12)
TUG					.16
					(.17)

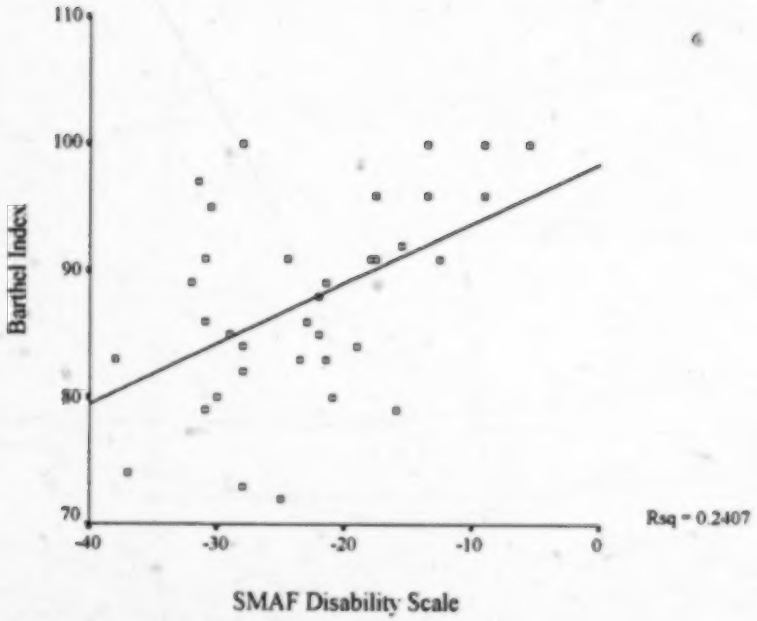

Figure 4.7 Correlation of the Barthel Index with the SMAF D

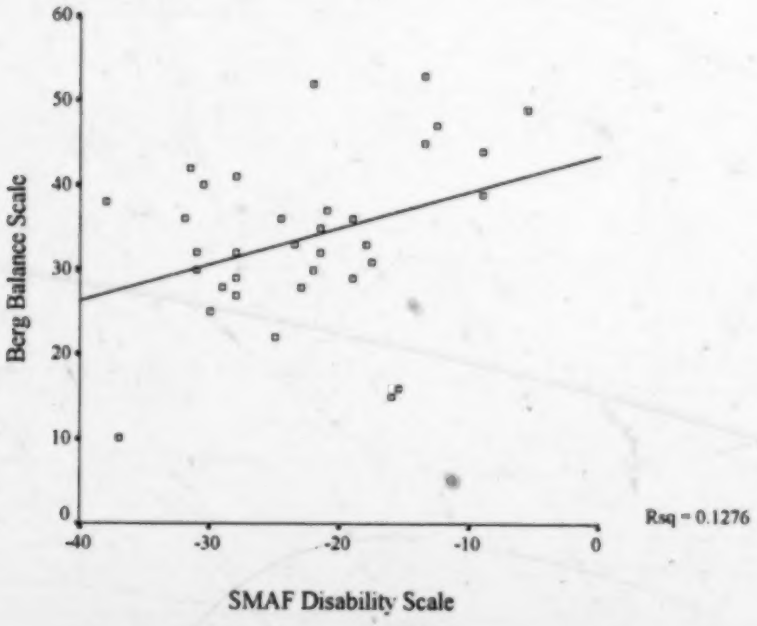

Figure 4.8 Correlation of the Berg Balance Scale with the SMAF D

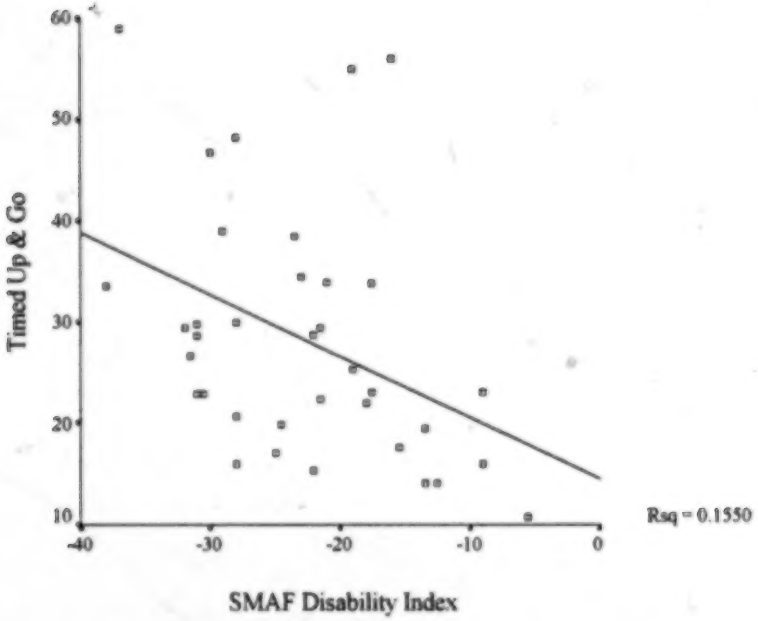

Figure 4.9 Correlation of the Timed Up & Go with the SMAF D

The results of a forced regression analysis (Table 4.7) indicated that disability and hours of service were poor predictors of handicap. ANOVA analysis and the coefficients of regression are included in Appendix M.

Table 4.7 SMAF D and Hours of Paid Formal Service Regressed on the SMAF Handicap Scale

R	R^2	Adjusted R^2	SEE
.21	.05	-.01	1.49

Additional Observations

As the relationships were not as strong as anticipated, further analysis was completed to explore whether the data followed the gender and aging patterns reported in the literature (Table 4.8-4.9). The SMAF D, BI, TUG and BBS followed the anticipated patterns of decreasing abilities with increasing age until the last decade. This suggested that the over 90 participants were a fit group with lower than anticipated disability, better balance skills and a faster walking speed. SMAF H and paid formal services did not follow any predictable pattern with aging. The SMAF ADL, IADL and mobility subscales, BI, BBS and TUG results for males and females were determined. Males and females had similar SMAF ADL & Mobility, BI and BBS ratings. Females were slower to complete the TUG course and were less disabled in IADL than males.

The study hypotheses concerning the relationship of the SMAF D with the BBS and the TUG were based on the literature[24,50] where these measures were compared to the BI. The BI is a summation of performance in ADL & mobility tasks. The SMAF disability score is a summation of performance in 5 areas (ADL, mobility, communication, mental function & IADL). Each SMAF subscale was correlated to the BI (Table 4.10) to ascertain if they were more closely related to the BI than the scale as a whole. Then, given that ADL & Mobility demonstrated a stronger relationship with the BI, these two subscales were totalled together and recoded as the modified SMAF. This was done to correlate that portion of the SMAF D that most closely resembled the BI (Table 4.10). It was anticipated that the correlation

would increase. Lastly, the modified SMAF was correlated to the BBS and the TUG (Table 4.10).

Table 4.8 Mean Outcome Measure For Each Decade (standard deviation in brackets)

Age (mean)	SMAF D	SMAF H	BI	BBS	TUG	Paid Service
60-69; n=5	-19.60	0.00	88.40	34.80	25.09	2.05
(66.60)	(11.38)	(0.00)	(14.17)	(18.02)	(19.06)	(2.92)
70-79; n=11	-23.09	-.91	88.27	33.82	27.76	4.00
(75.64)	(5.84)	(1.45)	(4.98)	(8.81)	(10.97)	(3.74)
80-89; n=15	-25.10	-.40	85.20	31.73	31.89	2.25
(83.80)	(7.82)	(.91)	(7.57)	(7.74)	(12.20)	(3.38)
90-99; n=5	-18.80	-2.00	92.80	38.60	22.75	4.85
(90.80)	(8.76)	(2.83)	(2.49)	(5.86)	(7.15)	(5.64)

Table 4.9 Mean Scores for Selected SMAF Subscales & All Outcome Measures for Males and Females

Outcome Measure	Males (n=7)	Females (n=29)
Age	75.86	80.86
ADL SMAF D	-3.21	-4.02
IADL SMAF D	-15.79	-12.06
Mobility SMAF D	-4.57	-4.34
BI	88.14	87.52
BBS	35.57	33.31
TUG	23.24	29.65

Table 4.10 Spearman Rho Correlations for Selected Outcome Measures with SMAF Subscales and the Modified SMAF (Bold for $p \leq .01$, one-tailed)

	SMAF Subscales					
	ADL	Mobility	Communication	Mental	IADL	Modified SMAF
BI	**.63**	**.51**	.22	-.04	.24	**.49**
BBS	.33	**.50**			.21	**.45**
TUG						**- .42**

Spearman's rho were calculated to determine if comparable items in the SMAF D and the BI were correlated (Table 4.11) and if selected SMAF subscales and the TUG were correlated (Table 4.12).

Table 4.11 Spearman Rho Correlations Between SMAF Disability and Barthel Index Items (Bold for p≤ .01, one-tailed)

SMAF Disability Item	Barthel Index Item	r Value
Eating	Feeding	.33
Washing	Bathing	**.64**
Dressing	Dressing	**.72**
Grooming	Personal Hygiene	.22
Urinary Function	Bladder	**.73**
Bowel Function	Bowels	.11
Toiletting	On/Off Toilet	.30
Transfers	Chair/Bed Transfer	.30
Walking Inside	Ambulation	.25
Negotiating Stairs	Stairs - One Flight	**.65**

Table 4.12 Relationship of the TUG to Selected SMAF Disability Subscales (Bold for p ≤ .01, one-tailed)

Relationship of the TUG to.....	Spearman's Rho Correlation
ADL SMAF Disability	**- .40**
IADL SMAF Disability	- .22
Mobility SMAF Disability	**- .52**

Chapter Five
Discussion

Introduction

The SMAF was developed to identify residential requirements and service needs for the health-compromised elderly. Five major areas of function were subdivided into a series of tasks representing Hebert's[16] interpretation of relevant functional performance for this age group. The purpose of this study was to evaluate whether the scale was related to accepted definitions of disability and acted as other disability scales have. Thus the scale's relationship to another disability measure; the BI, and to physical performance measures; the TUG and BBS, were explored. The results of the study support the usefulness of the SMAF in the measurement of disability for the elderly in the community. The SMAF D was moderately correlated with the BI and the TUG but not correlated with the BBS. Postulated reasons for the nature and strength of the relationships observed in this sample are examined in the following discussion.

Factors Affecting the Degree of Confidence in the Results Obtained

Several factors may affect the confidence with which the results are interpreted. These include the extent to which the study sample represented the Home Care population, the intra-rater reliability for each measure, and the behaviours of the independent measures (the Modified BI, TUG and BBS) with respect to each other. An evaluation of each of these factors follows.

Although the study sample was similar to the Edmonton Home Care population with respect to gender, age, program, residence type, living arrangements and paid service use (Table 4.1), its diagnostic and gender mix may limit the generalizability of the results. Chi square analysis (Table M.4) did not identify gender as different among the groups, but the results approached statistical significance. The percentage of females was also higher than would be expected given what has previously been reported in the literature for disabled older community-dwelling adults.[27] It is not known whether the therapists seeking participants in this study were more comfortable asking females or whether more females than males were receiving rehabilitation at the time the study occurred. The interpretation of observed differences in diagnoses between the sample and the population is limited as secondary diagnoses are inconsistently recorded on the admitting records. There is little sociodemographic difference between the sample group and the Edmonton Home Care population. Therefore the results of this study are considered to be generalizable to the parent Edmonton Home Care population.

Measures of rater reliability and the degree of their measurement error influence the relevance of the correlation coefficients obtained.[18] The pilot study for the SMAF D, BI, TUG and BBS (Table 3.1) demonstrated good intra-rater reliability (ICC > 0.90 and low SEM). The raters were consistent in their interpretation of the information given and the performance observed. These two factors allow for greater confidence in the accuracy of the correlation coefficients obtained and in their interpretation.[18,64]

Confidence in the correlation coefficients obtained between the SMAF D and the selected outcome measures, the BI, TUG and BBS, is enhanced if the independent variables behaved as expected. Thus the correlation coefficient matrix tables were examined (Table 4.5). Observed relationships among the BI, TUG and BBS were similar to those previously reported in the literature.[24,50] In one study of the elderly, the BBS was significantly correlated to the BI (r = .67).[50] In a day hospital study of older community-dwelling adults, the TUG was significantly correlated to the BI (r = -.55) and to the BBS (r= - .72 - .76).[24] Although the correlation between the TUG and the BBS was lower (r = .59) in the present study, it fell within the same moderate range[24] of .50 - .75[18] as the day hospital study. The slightly higher correlation value obtained in the day hospital study may have been influenced by the heterogeneity of the sample (TUG , 0 - 240 seconds, and the BBS, 0 - 56).[24] These ranges included the extremes for each measure thus increasing the line of best fit between the two variables. The repetition of these known relationships among the independent variables adds to the confidence in the correlations observed between the SMAF D and the BI, TUG and the BBS.

The Relationship of the SMAF D with the Barthel Index

The correlation between the SMAF D and the BI was lower than the hypothesized coefficient value of $r \geq .50$. Similarities and differences in construction of the two scales determined the strength of this relationship.

The definition of functional performance in the elderly affects which tasks are selected for measurement . The BI defines functional performance as the ability to

complete tasks in ADL and indoor mobility[11]. However, the BI lacks relevance to those individuals with multi-system disability that includes deficits in communication and/or mental function.[56,57,65] The community-dwelling elderly have a high incidence of comorbidity implying multi-system involvement.[51] Often a decrease in IADL is the first indicator of a change in health status, reflecting loss of outdoor mobility and declining physical performance (lower extremity strength, endurance, gait velocity and balance).[1,2,5,14,49,66] A decline in mental function is correlated with functional dependence in the community-dwelling older adult.[8] Thus including measures of outdoor mobility, IADL , mental function and communication in the same scale is meaningful. The SMAF D extends the functional performance model to include these areas.[16]

To further evaluate the shared domains of function included in each scale, the number of ADL and mobility questions in the SMAF was totalled. Only 13/29 questions or 45% of the SMAF D measured ADL and mobility. It was assumed that if these items were separated out of the SMAF, summed (to become the Modified SMAF Disability Score) and then correlated to the BI, the Spearman Rho correlation coefficient would increase. The results supported this (Table 4.9). Thus the extended functional performance model of the SMAF D to include IADL, mental function and communication affected the correlation coefficient strength.

ADL and mobility for the SMAF and the BI were further examined. Correlations between similar tasks from both scales were calculated. Not all paired tasks demonstrated strong, significant correlations (Table 4.10). For example, SMAF walking indoors and BI ambulation items were not related ($r = .25$). The labeling of

each task would suggest that both tap the same functional skill. However the SMAF D addresses the physical act of walking, whereas the modified BI also considers the ability to put on any bracing and get out of a chair. These are considered separately in the SMAF. The different definition of each skill level may result in the same performance being ranked differently across the scales. For instance the inclusion of activities (bracing independence) in the BI that are peripheral to the actual task (walking) may result in inconsistent ranking of the same level of SMAF D performance (independent walking) lowering the relationship between scales.

The metric used in each scale was reviewed for its relative importance in contributing to the results obtained in this study. Each task and level of performance is treated equally in the SMAF D with a possible score ranging from 0 to –3. However the modified BI is a weighted scale. Some tasks are rated higher and all tasks have unequal differences between the performance levels. For example, feeding is scored out of 10 (levels of performance rated at 0, 2, 5, 8, 10) whereas ambulation is out of 15 (levels of performance rated at 0, 3, 8, 12, 15). In spite of the different scoring techniques between the SMAF and the BI one would still anticipate that the relative ranking of the scores would be maintained and that the Spearman's Rho correlation coefficients would be high. However statistical analyses did not support this assumption for either the individual items or the scale totals (Table 4.6 & 4.10). Further support is lent to the argument that item definition differs between the scales and that the performance level chosen for an item in one scale may fall into more than one level in the second scale.

In the measurement of the community-dwelling elderly, is either scale's metric more meaningful? The weighting selected for the modified BI items was based on nursing, physician and physical therapy input.[56] The standard for the determination of weighting of a task was defined by the social acceptance of disability in that area.[56,57] The individual context and the importance of a deficit in any area for a particular individual appear to have been ignored. Thus the weighting of the items may not be individually relevant. The SMAF D avoids this by treating all tasks and levels of performance as the same. The question then becomes whether the SMAF's levelling of performance is meaningful at an individual level.

Although the literature has supported the modified BI as a measurement of disability[11,56,57], there is a reported ceiling effect seen in the community-dwelling older adult. The score of 100 does not necessarily represent lack of disability.[57] The SMAF study supported this observation. Four subjects received a BI score of 100 suggesting no disability. However their SMAF Disability scores ranged from -5.50 to -28.00 indicating varying degrees of disability (Figure 4.1, Appendix N). Thus the SMAF was better able to discriminate among the higher functioning elderly.

The lower than predicted r value for the BI and the SMAF supports the uniqueness of the SMAF D. It's extended model of functional performance to include measures of mental function, communication and IADL increases its relevance to the community-dwelling elderly. It has not demonstrated a ceiling effect and is better able to discriminate among this higher functioning cohort.

The Relationship of the SMAF D with the Timed Up & Go

The SMAF D was significantly correlated to the TUG. The relationship was close to the hypothesized value of 0.50. The value was selected from the results of a past study that examined the relationship of another disability scale, the BI, to the TUG.[24] It was assumed that the SMAF D would behave in a similar fashion. Factors that affected the strength of the observed relationship were the characteristics of the sample and the nature of the SMAF.

The TUG scores (Table 4.3) were as anticipated for a sample of health-compromised elderly. The subjects took longer than a group of healthy older adults (10.34 seconds)[25] and a group of institutionalized elderly where few required walkers (26.9).[50] The range of values obtained in the present study was less than that of a previous day hospital study of unwell older adults (n = 60, range 0 - >70 seconds).[24] That study included the non-ambulatory and subjects unable to complete the 3 meter course. There were no participants in this present study unable to complete the TUG.

In the present study, TUG times were lower for males (Table 4.8) and increased with age until the final decade (Table 4.7). Similar patterns have been found for the healthy community-dwelling elderly.[25] Males, walking independently or with a cane, had shorter TUG times and TUG times increased with age (n = 175, 65-79 years).

The TUG demonstrated a stronger relationship to mobility, ADL and IADL (Table 4.11) than would be anticipated from the literature.[3,7,28] Past research had related measures of gait velocity to self-reported ADL (r = .13 - .16), IADL (r = .17 - .33) and mobility (r = .17 - .32).[28] As the TUG is related to gait velocity (r = -

.55)[24,50], it was assumed that the TUG and selected SMAF D subscales would demonstrate similar relationships (Table 4. 11). It is not known to what extent the difference observed was secondary to sample characteristics or the difference in measures used (gait velocity vs. TUG times).

The correlation between the TUG and the SMAF D was lower than between the TUG and the BI.[24] This reflects the broader range of functional tasks assessed by the SMAF compared to the BI. Research has not yet examined IADL, mental function and communication for their relationship to the TUG. Because the TUG behaved as expected, there is increased confidence in the correlation found in the present study.

The Relationship of the SMAF D with the Berg Balance Scale

The observed relationship between the SMAF D and the BBS was lower than that hypothesized. The data collected, the research methodology and current literature provide some explanations for the correlation value obtained.

The mean BBS value obtained in the present sample (Table 4.3) was close to that noted previously with the health-compromised elderly (n=31, BBS = 38.2; sd =9.8).[50] In the present study, 47.2% required a walker and 91.7% used a walking aid (Table 4.2). Past research has found that use of a walking aid is associated with lower mean BBS scores (31.1 - 39.0).[50] In that study 66% of the participants used a walking aid.

ADL and mobility sections of the SMAF D from the present study were totalled (modified SMAF) and correlated to the BBS resulting in an increase in the correlation coefficient observed (Table 4.9). However, the value was still lower than

that anticipated. This result may be due in part to the inclusion of post-surgical subjects with orthopaedic conditions. Eight of the 36 subjects had weight-bearing restrictions secondary to arthoplastic (hip/knee) and internal fixation (# hip) surgeries. These restrictions prevented completion of the entire BBS. Thus scores obtained with these clients were potentially lower than expected given their reported disability level. Raw sample data for these 8 subjects attest that a low BBS scale was not always accompanied with a low SMAF D (Appendix O).

In the present study gender and age differences in BBS scores were similar to those reported in the literature. Males performed slightly better than their female cohorts (Table 4.8) and BBS scores decreased with age until 90 years (Table 4.7). The literature supports both observations. Males have been noted to perform better on assigned balance tasks.[67] The literature reports an observed trend of declining balance skills with aging[67-69] despite observed variability in balance performance.[70]

Although correlations between the SMAF D, ADL/IADL subscales and balance were low in the present study (Table 4.9), they were comparable to previously reported correlations between balance and function. Poor balance has been weakly associated with poor functional performance.[2,3,6-8,28,49] The Pearson's Product correlation coefficients have ranged from 0.13 - 0.26 for ADL scales[49,66] and from 0.29 - 0.21 for IADL.[28,49,66] The replication of previously reported trends for the community-dwelling elderly lends further support to the relevance of the SMAF D for the Home Care client.

Measurement Factors that Influenced the Results Obtained in all Outcome Measures

The initial study proposal stipulated that rating sessions would occur within 5 working days of each other. However the availability of the raters and the willingness of the volunteer patients to accommodate this restraint led to fluctuations between rating periods from 48 hours to 6 weeks with a mean time of 17.69 ± 15.62 days between assessments. There was also an inability to control for the time of day that the ratings occurred for the reasons stated above. Although actual physical changes or normal fluctuations in physical health within the subjects may account for some of the lower than anticipated correlations between measures, the literature supports the stability of functional performance for the elderly over a 6 week period.[43,44]

Participants in the study may/may not have been receiving treatment (medical or rehabilitation) that would influence their functional performance levels between rating sessions. There was no attempt made to control for intervention and it is not known what effect, if any, this may have had on the relationships observed.

The oldest group (90-95 years, n = 5; Table 4.7) in our sample consistently scored higher than their younger counterparts for all measures. Their observed performance reflected a higher functioning cohort. Their data lent support to this conclusion and agreed with past observations that those requiring less help with ADL and mobility functions performed better in balance tests.[69]

The first rater was present for three of the second rating visits by the second rater. Each time rater 1 was present it was due to a patient request or a concern related to the patient's health. During these sessions, rater 1 did not interfere in the

measures and remained behind the visual field of the client. However the presence of rater 1 may have influenced either the administration of the test by the second rater or the performance of the patient. Rater 2 was asked at the end of the study if the added presence of rater 1 influenced her results. She stated that there was no effect. These factors listed are realities when doing clinical research in a community setting. The extent of their influence on the results obtained is not known.

The Ability of the SMAF D & the Hours of Paid Formal Service to Predict the SMAF Handicap Scale

The SMAF H is determined from the SMAF D and the resources available that permit successful completion of a task. The instrument is meant to identify deficits between service need and currently available resources across all health provision settings: home, hospital & institution. In this study part of the model was tested by measuring how much of the SMAF Handicap Scale could be explained by the SMAF D and paid formal service provided through home care. It was anticipated that these two measures would explain a fair portion of the handicap score given the scale's construction. However these two factors accounted for a very small portion of the variance observed in the handicap scale (<5%, Table 4.6) and the relationship observed was not significant.

The timing of the assessment relative to Home Care admission and scale construction are two factors influencing the results obtained. All subjects were seen after their initial Home Care intake interview. Thus formal service provision was in place and the disability rating for pertinent items was reduced to 0 on the handicap

side of the SMAF. The low mean scores for service provision also suggest that other sources of support played a major role in minimizing the impact of disability for an individual (Table 4.3). The restricted variance of both the SMAF H and the paid formal services would contribute to low correlation coefficients and poor prediction.[62]

Although the nature of the scale did not lend itself to statistical testing of its theoretical framework, the SMAF can be evaluated conceptually. Hebert's interpretation of handicap is not supported by the definition provided in the ICIDH.[19] Handicap is defined as an individual's social disadvantage resulting from his/her disability, environmental demands and resources available. Hebert considers all three areas in his scale structure: disability, environment and resources. The SMAF H measures the impact of disability for the elderly given their current environment and resources. However, handicap for an individual is determined by the personal relevance of that task to his/her normal social and environmental roles (personal context).[19] There is no means of identifying this information in the SMAF H. For example, a male and a female were assessed for meal preparation, each scoring -3 for disability and 0 for handicap. Without prior knowledge of their personal context, can we state that either are truly handicapped? It may be that the female has always prepared meals for her family . The loss of that ability alters her perception of herself and her role within the family. For the male, if he lives alone and has prepared all his own meals, then its loss has personal significance. However, if he is in a relationship and has never had to prepare meals, then his inability to do so is irrelevant. The

SMAF does not allow for the identification of handicap but only the consideration of whether a task can be successfully completed.

The misuse of the word handicap does not make the scale meaningless in the measurement of the elderly on Home Care. The ability of current resources in the home to meet the needs of the health-compromised elderly determines whether they can continue in a community environment. The SMAF identifies the necessary components: the performance level of a specific task including the need for, and type of, assistance required; and the type and stability of resources currently used to assist with completion of the specific task. The SMAF is seen as clinically relevant, identifying gaps between the help required to complete specific functional tasks, as defined by the older adult, and the help available. It provides a mechanism for exploring different types of resource support with older adults and/or their caregivers in their own environment. The SMAF also creates a method of systematically reviewing the current stability of support structures being used in the home.

The SMAF is a clinically relevant tool for the measurement of functional performance in the community-dwelling elderly. It is related to the BI and the TUG. The extension of functional performance to include consideration of outdoor mobility, IADL, communication and mental function reduces the number of tools that need to be administered. The short administration time (10 - 30 minutes) makes it easy for clinicians and clients alike.

Suggestions for Future Research

Further exploration of the clinical value of the SMAF for the community-dwelling elderly on Home Care is of interest. Research that examines the ability of the SMAF to reflect system stability would be valuable. Is there a relationship between measures of caregiver burden and the amount of formal service provided? Is there an identifiable limit to the disability level and formal/informal service provision that dictate the need for institutionalization?

There is a mechanism within the scale for evaluating the effect of intervention if it is the provision of support/resources. However, whether the tool is responsive to other forms of intervention (eg. rehabilitation) remains an issue to be further evaluated. Then the accompanying questions regarding the responsiveness of the SMAF are whether the Disability SMAF or the Handicap SMAF are more responsive and lastly, is the SMAF more responsive than other disability measures to change.

Chapter Six

Summary and Conclusions

The purpose of this study was to validate the SMAF in the measurement of the community-dwelling elderly by examining its relationship to a functional performance scale, the modified BI, and to two physical performance measures, the TUG and the BBS. This descriptive, correlational study used volunteers from the Rehabilitation LTC/STIT admissions of the Edmonton Southwest Home Care program over a four-month time period.

There were 36 participants in this study with no drop-outs. Subjects were assessed on two separate occasions by two different physical therapists. The first rater collected demographic information including medical, social, physical activity and walking aid use, then administered the SMAF. The second rater completed the modified BI, the TUG and the BBS in that order. The mean time between rating assessment interviews was 17.69 days.

Pearson's Product Moment Correlation coefficients and Spearman's rho were calculated to determine the relationship between the SMAF D and the BI, BBS and TUG. The underlying assumptions of normal distribution were tested for the data collected. A forced regression analysis was calculated to determine the extent that the SMAF D score + hours of paid resources predicted the SMAF H score.

The results of this study demonstrated the SMAF was a valid tool for the community-dwelling elderly because:

1. There was a moderate, significant relationship between the SMAF D and the Barthel Index.
2. There was a moderate, significant relationship between the SMAF D and the Timed Up and Go.
3. There was no observed ceiling effect with the SMAF D, but there was with the BI.

The results of this study did not support the existence of a relationship between the SMAF and the Berg Balance Scale. The theoretical framework was not supported as the SMAF D score and the hours of formal service provision were not good predictors of the SMAF Handicap Scale score.

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APPENDIX A SAMPLE SIZE

Size Calculation when using Correlation Coefficient, r[55]:

1. Null Hypothesis : There is no relationship between the scores obtained on the disability SMAF and the Barthel Index in the community-dwelling older adult admitted to the Home Care program.
2. Alternative Hypothesis: The disability SMAF score is positively correlated to the Barthel Index for clients on Home Care.
3. At alpha = .01 (one-tailed); power = 0.80 and an anticipated r = 0.50, the sample size is 36.[55]

Table A.1 Sample Size (n) Needed to Detect r By t Test[55]

	$a_1 = .01$ ($a_2 = .02$)								
	r								
Power	**.10**	**.20**	**.30**	**.40**	**.50**	**.60**	**.70**	**.80**	**.90**
.25	273	68	31	18	12	9	7	5	4
.50	540	134	59	31	20	14	10	7	5
.60	663	164	72	39	24	16	11	8	6
2/3	757	187	81	44	28	18	13	9	6
.70	809	200	87	48	29	19	13	9	6
.75	897	221	96	53	32	21	14	10	7
.80	998	246	107	58	**36**	23	16	11	7
.85	1126	277	120	65	40	26	17	12	8
.90	1296	319	138	75	45	29	20	13	8
.95	1585	389	168	91	55	35	23	16	10
.99	2154	529	228	123	74	47	31	20	13

APPENDIX B. CONSENT FORM

Title: The Construct Validity of the Functional Autonomy Measurement System (SMAF)for the Older Adult on Home Care

Investigator: Kari Elliott, Case Manager (Physical Therapist)
Master's Candidate
Edmonton Home Care
(403) 496 - 8445, extension 3909

Thesis Advisor: Dr. Jean Wessel, PhD
Department of Physical Therapy
Faculty of Rehabilitation
University of Alberta
(403) 492 - 7336

Do you understand that you have been asked to be in a research study?	Yes	No
Have you read and received a copy of the Information Sheet?	Yes	No
Do you understand the benefits and risks involved in taking part in this research study?	Yes	No
Have you had an opportunity to ask questions and discuss this study?	Yes	No
Do you understand that you are free to refuse to participate or withdraw from the study at any time? You do not have to give a reason and it will not affect your care.	Yes	No
Has the issue of confidentiality been explained to you? Do you understand who will have access to your records?	Yes	No

This study was explained to me by: _____

I agree to take part in this study.

_____ _____

Signature of Research Participant Date

_____ _____

Witness Date

I believe that the person signing this form understands what is involved in the study and voluntarily agrees to participate.

_____ _____

Signature of Interviewer Date

Note: The font size on the consent form was reduced from 14 to fit into the established margins of the thesis.

APPENDIX C. INTRODUCTORY LETTER

Title: The Construct Validity of the Functional Autonomy Measurement System (SMAF) for the Older Adult on Home Care

Investigator: Kari Elliott, Case Manager (Physical Therapist)
Master's Candidate in Physical Therapy
Edmonton Home Care
(403) 496 - 8445, extension 3909

Thesis Advisor: Dr. Jean Wessel, PhD; Professor
Department of Physical Therapy
Faculty of Rehabilitation
University of Alberta
(403) 492 - 7336

Dear _____,

We are doing a study of a new assessment tool for the older adult who is living in the community and accessing heath care. Our records show that you have recently been admitted to Home Care.

We would appreciate it if you would allow us to use this new measurement on you. You will be visited twice about a week apart. Each visit will last about 45 minutes. In the first visit a physiotherapist will ask questions about how you look after yourself within the home. On the second visit, another physiotherapist will ask a few questions about how you look after yourself. Then she will ask you to complete different tasks while standing. The physiotherapist will also ask you to get up from a chair, walk a short distance in your usual way, return to the chair and sit

down. If you feel these questions or tasks are too difficult for you to do, you may stop. These questions and tasks are similar to what is currently asked of new clients admitted to Home Care. The difference is in the way the information is collected and recorded. If you identify any new concerns we will tell your Case Manager if you want us to.

We would like your permission to take information regarding current medication and diagnoses from your Home Care records. All information obtained from the visits and from your Home Care records will be confidential. Your name will not appear on the completed questionnaire or assessment. Only a code number will be used. Your name will not occur on any published document arising as a result of this research. Any information presented will be in summary form.

Your participation in this project is voluntary. Whether you choose to participate or not does not affect the type and quantity of service you will receive from Edmonton Home Care. You may refuse to answer any questions and may withdraw from the study at any time without consequences to yourself. You will receive no direct benefit from participating in this study.

If you have any concerns about any aspect of this study, you may contact Patient Concerns Office of the Capital Health Authority at 474-8892. This office has no direct involvement with the study.

Kari Elliott (one of the researchers) will contact you soon to ask if you are willing to participate. If so, an assessment time will be arranged. If you have any questions before contact is made, please call Kari Elliott at the following number; 496-8445.

Thank-you for considering this request.

Kari Elliott,
Master's Candidate (PT)
Physical Therapist
Edmonton Home Care

Dr. Jean Wessel, PhD;
Thesis Advisor
University of Alberta

APPENDIX D. DEMOGRAPHIC DATA FORM

Code:

Gender: Male

Female

Age:

Diagnoses:

Cardiovascular -

Myocardial Infarct

Cardiac Arrythmias

Angina

Hypertension

PVD

Pulmonary -

COPD

Asthma

Emphysema

Bronchitis

Neurological -

Stroke

PD

MS

ALS

Cerebellar Degeneration (Not stroke related)

Musculoskeletal -

Osteoarthritis

Rheumatoid Arthritis

Gout

Osteoporosis

Hip Fractures

Fractures other than hip

Diabetes

Cancer

Visual Loss

Cataracts

Glaucoma

Macular degeneration

Arthoplasty & Type

Other

Total number of Identified Medical Diagnoses:

Residence at time of referral:

private home

lodge

group home

other

Who the client lives with at the time of referral:

alone

with spouse only

with spouse and others

with a child

with others (not spouse or child)

in a group setting with non-relatives

Support Services:

Home care

Mental Health

Meals on Wheels

Family

Volunteer

Private hired support (specify to do what)

SMAF: Disability Score ____

Handicap Score ____

Recent Activity Levels:

1. In the past week have you been outside the room where you live? Yes__ No__
2. In the past week have you been outside your home or apartment? Yes__ No__
3. In the past week did you leave the neighbourhood (that is, to go shopping, visit friends, go to church, etc.)? Yes__ No__

Walking Aid Patterns:

Do you use a walking aid ? Yes __ No ___

Do you use a walking aid all the time? Yes __ No ___

Do you use a walking aid only when outside and for long distances? Yes __ No ___

Do you use a walking aid intermittently in the home? Yes __ No ___

Tick the walking aid used:

Standard cane __

Quad cane __

Standard walker __

Wheeled walker (2) __

Wheeled walker (3) __

Wheeled walker (4) __

Wheelchair dependent __

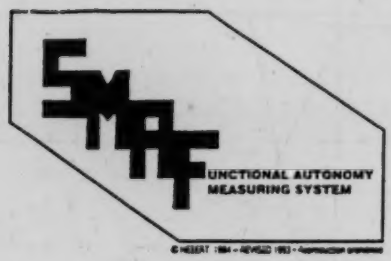
Modified Barthel Index ____

Berg Balance Scale _____

Timed Up and Go (seconds) ____

Hours of paid Home Care Nursing/Homemaking _____

APPENDIX E. FUNCTIONAL AUTONOMY MEASUREMENT SYSTEM



AUTONOMY ASSESSMENT SCALE

Name: _____

Dossier: _____

Date: _____ Assessment #: _____

DISABILITIES	RESOURCES 0. Subject himself 2. Neighbour 4. Aides 6. Volunteer 1. Family 3. Employee 5. Nurse 7. Other	HANDICAP	STABILITY*
A. ACTIVITIES OF DAILY LIVING (ADL)			
1. EATING			
[0] Feeds self independently 45 Minutes/day	Does the subject presently have the resources (help or supervision) necessary to overcome this disability? ☐ Yes ☐ No Resources: ☐ ☐ ☐	[0] [1] [2] [3]	☐ ☐ ☐
[1] Feeds self but needs stimulation or supervision OR food must be prepared or cut			
[2] Needs some help to eat OR dishes must be presented one after another			
[3] Must be fed by another person OR has a naso-gastric tube OR a gastrostomy ☐ naso-gastric tube ☐ gastrostomy			
2. WASHING			
[0] Washes self independently 45 Minutes/day	Does the subject presently have the resources (help or supervision) necessary to overcome this disability? ☐ Yes ☐ No Resources: ☐ ☐ ☐	[0] [1] [2] [3]	☐ ☐ ☐
[1] Washes self but needs cueing OR needs supervision OR needs preparation OR needs help for the complete weekly bath			
[2] Needs help for the daily wash but participates actively			
[3] Must be washed by another person			
3. DRESSING			
[0] Dresses self independently 45 Minutes/day	Does the subject presently have the resources (help or supervision) necessary to overcome this disability? ☐ Yes ☐ No Resources: ☐ ☐ ☐	[0] [1] [2] [3]	☐ ☐ ☐
[1] Dresses self but needs cueing OR needs supervision OR clothing must be readied and presented OR needs help for finishing touches only (buttons, laces)			
[2] Needs help dressing			
[3] Must be dressed by another person			

* STABILITY: In future weeks, it is foreseen that these resources will: ☐ lessen, ☐ increase, ☐ remain stable or does not know.

DISABILITIES

0 Subject himself/herself 2 Neighbour 4 Peers 6 Volunteer
1 Family 3 Employer 5 Social 7 Other

4. GROOMING
(Brushes teeth, combs hair, shaves, trims finger and toenails)

[0] Grooms self independently
45 - With difficulty
[-1] Grooms self but needs cueing or supervision
[-2] Needs help for grooming
[-3] Must be groomed by another person

Does the subject presently have the resources (help or supervision) necessary to overcome this disability?
☐ Yes
☐ No
Resources: ☐ ☐ ☐

5. URINARY FUNCTION

[0] Normal voiding
[-1] Occasional incontinence
OR dribbling
OR needs cueing to avoid incontinence
[-2] Frequent urinary incontinence
[-3] Complete urinary incontinence
OR wears a diaper OR an indwelling catheter OR a urinary condom
☐ diaper, ☐ indwelling catheter, ☐ urinary condom

Does the subject presently have the resources (help or supervision) necessary to overcome this disability?
☐ Yes
☐ No
Resources: ☐ ☐ ☐

6. BOWEL FUNCTION

[0] Normal bowel function
[-1] Occasional incontinence
OR needs cleansing enema occasionally
[-2] Frequent incontinence
OR needs cleansing enema regularly
[-3] Always incontinent
OR wears a diaper OR an ostomy
☐ diaper, ☐ ostomy

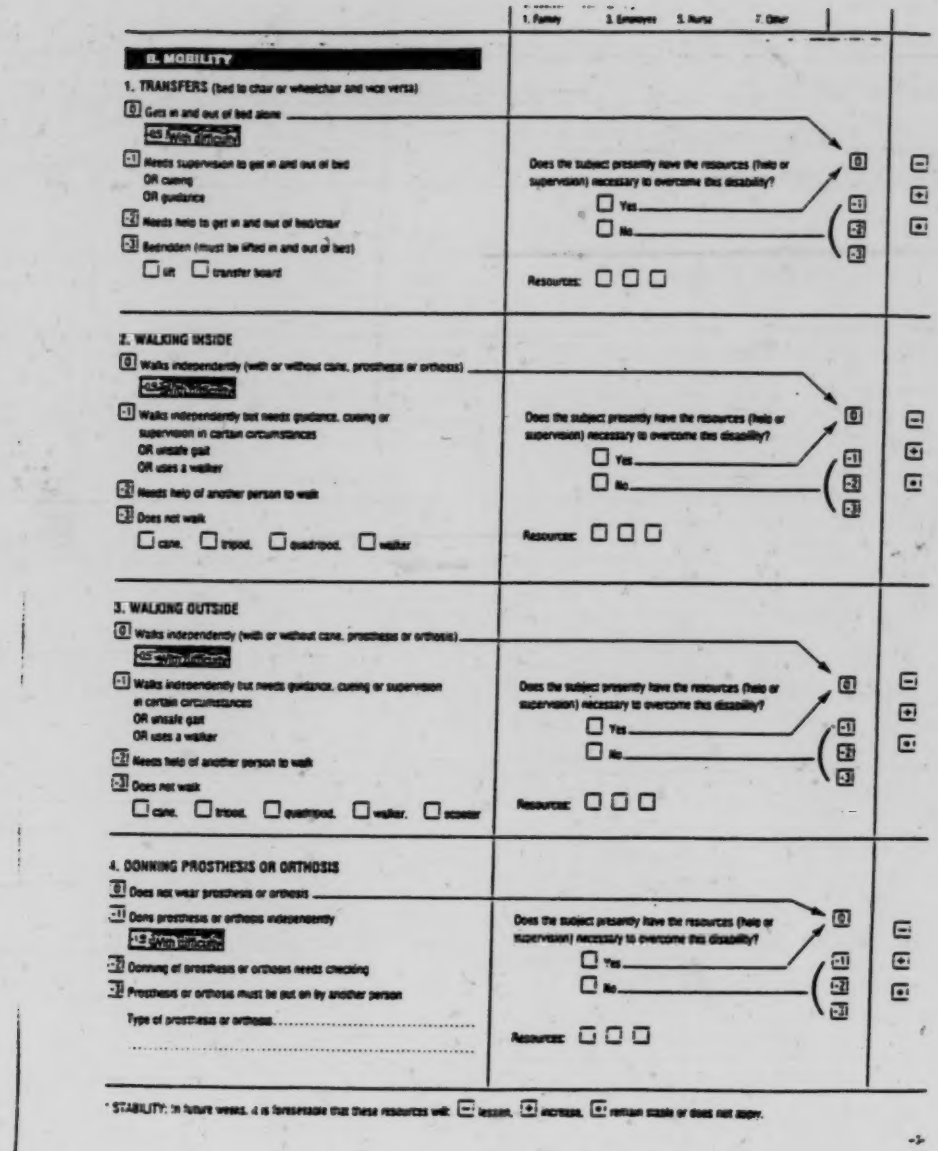
Does the subject presently have the resources (help or supervision) necessary to overcome this disability?
☐ Yes
☐ No
Resources: ☐ ☐ ☐

7. TOILETTING

[0] Toilets self (including getting on/off toilet, managing perineal care and clothing)
45 - With difficulty
[-1] Needs supervision for toileting
OR uses commode, bedpan or urinal
[-2] Needs help using toilet, commode, bedpan or urinal
[-3] Does not use toilet, commode, bedpan or urinal
☐ commode, ☐ bedpan, ☐ urinal

Does the subject presently have the resources (help or supervision) necessary to overcome this disability?
☐ Yes
☐ No
Resources: ☐ ☐ ☐

* STABILITY: In future weeks, it is foreseeable that these resources will: ☐ lessen, ☐ increase, ☐ remain stable or does not apply.



1. Family 3. Employer 5. Nurse 7. Other

B. MOBILITY

1. TRANSFERS (bed to chair or wheelchair and vice versa)

0 Gets in and out of bed alone

45 Very important

-1 Needs supervision to get in and out of bed
OR cueing
OR guidance

-2 Needs help to get in and out of bed/chair

-3 Bedridden (must be lifted in and out of bed)
☐ sit ☐ transfer board

Does the subject presently have the resources (help or supervision) necessary to overcome this disability?
☐ Yes → 0
☐ No → -1, -2, -3

Resources: ☐ ☐ ☐

⊟ ⊞ ⊡

2. WALKING INSIDE

0 Walks independently (with or without cane, prosthesis or orthosis)

45 Very important

-1 Walks independently but needs guidance, cueing or supervision in certain circumstances
OR unsafe gait
OR uses a walker

-2 Needs help of another person to walk

-3 Does not walk
☐ cane. ☐ tripod. ☐ quadripod. ☐ walker

Does the subject presently have the resources (help or supervision) necessary to overcome this disability?
☐ Yes → 0
☐ No → -1, -2, -3

Resources: ☐ ☐ ☐

⊟ ⊞ ⊡

3. WALKING OUTSIDE

0 Walks independently (with or without cane, prosthesis or orthosis)

45 Very important

-1 Walks independently but needs guidance, cueing or supervision in certain circumstances
OR unsafe gait
OR uses a walker

-2 Needs help of another person to walk

-3 Does not walk
☐ cane. ☐ tripod. ☐ quadripod. ☐ walker. ☐ scooter

Does the subject presently have the resources (help or supervision) necessary to overcome this disability?
☐ Yes → 0
☐ No → -1, -2, -3

Resources: ☐ ☐ ☐

⊟ ⊞ ⊡

4. DONNING PROSTHESIS OR ORTHOSIS

0 Does not wear prosthesis or orthosis

-1 Dons prosthesis or orthosis independently

45 Very important

-2 Donning of prosthesis or orthosis needs checking

-3 Prosthesis or orthosis must be put on by another person

Type of prosthesis or orthosis.....
.....

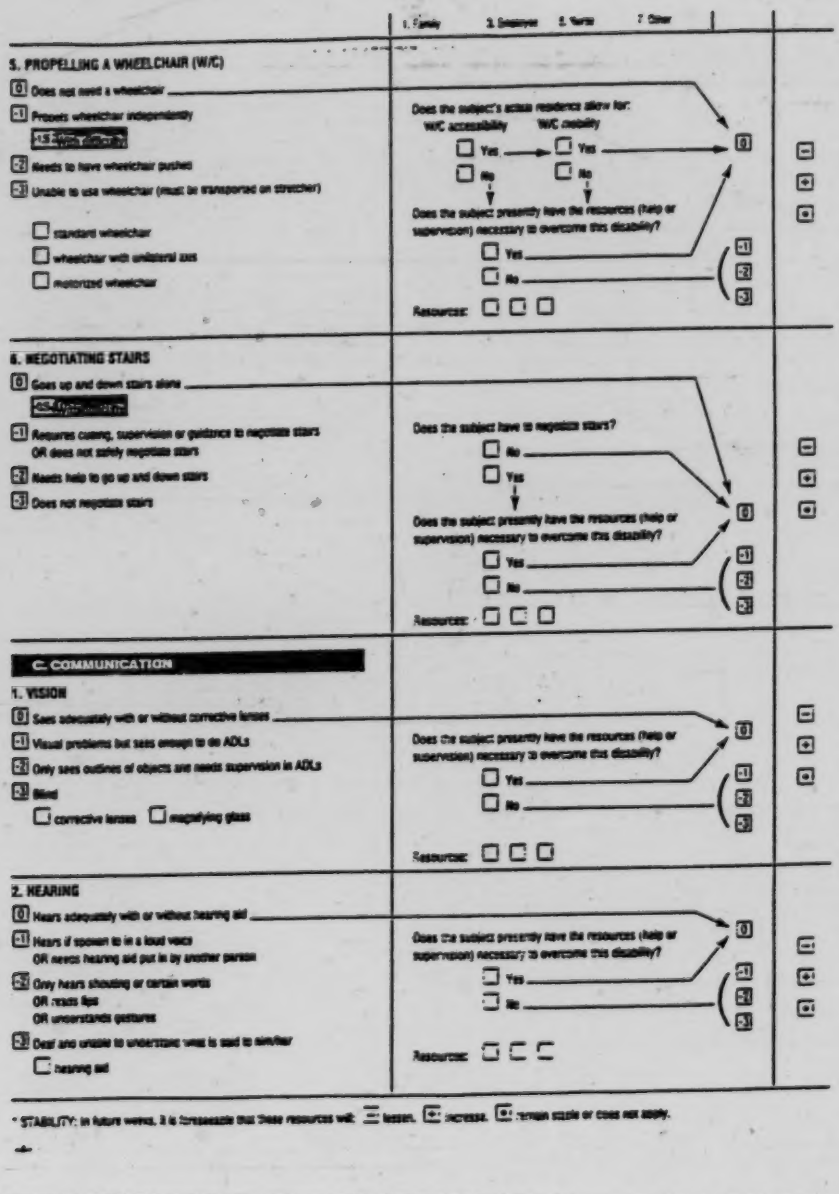
Does the subject presently have the resources (help or supervision) necessary to overcome this disability?
☐ Yes → 0
☐ No → -1, -2, -3

Resources: ☐ ☐ ☐

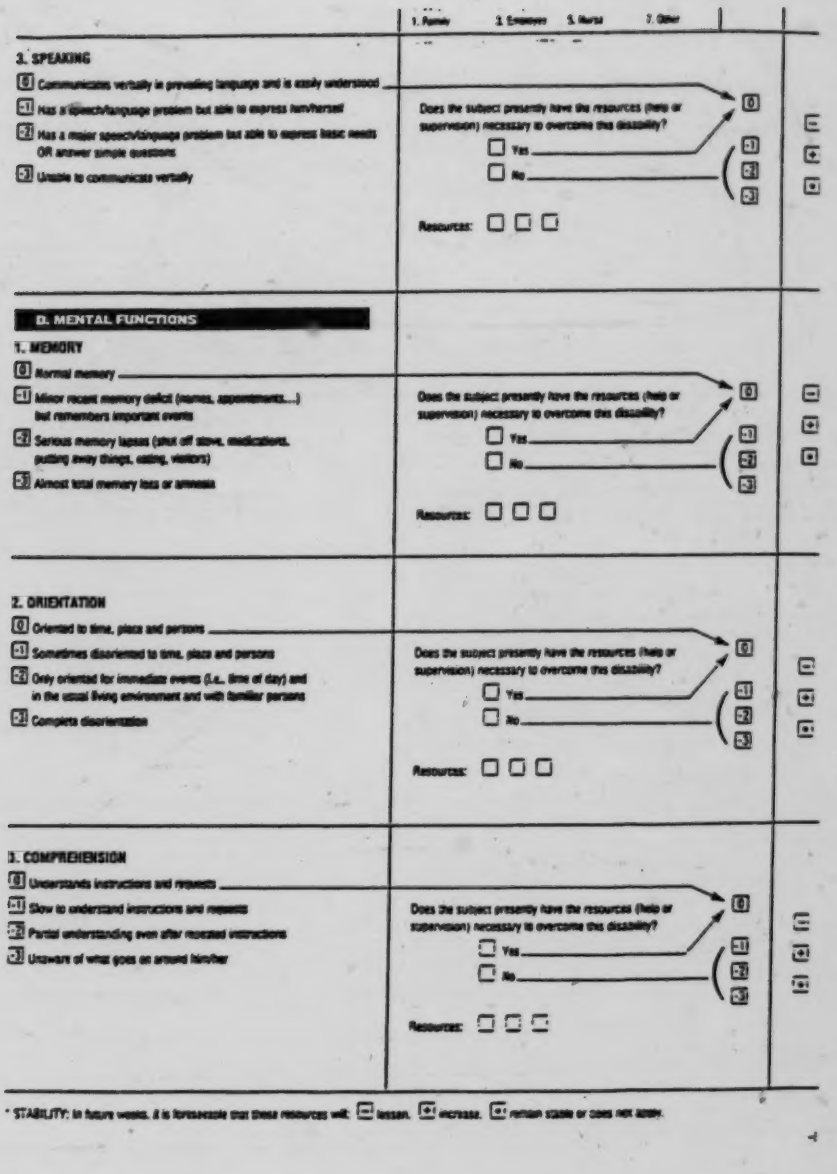
⊟ ⊞ ⊡

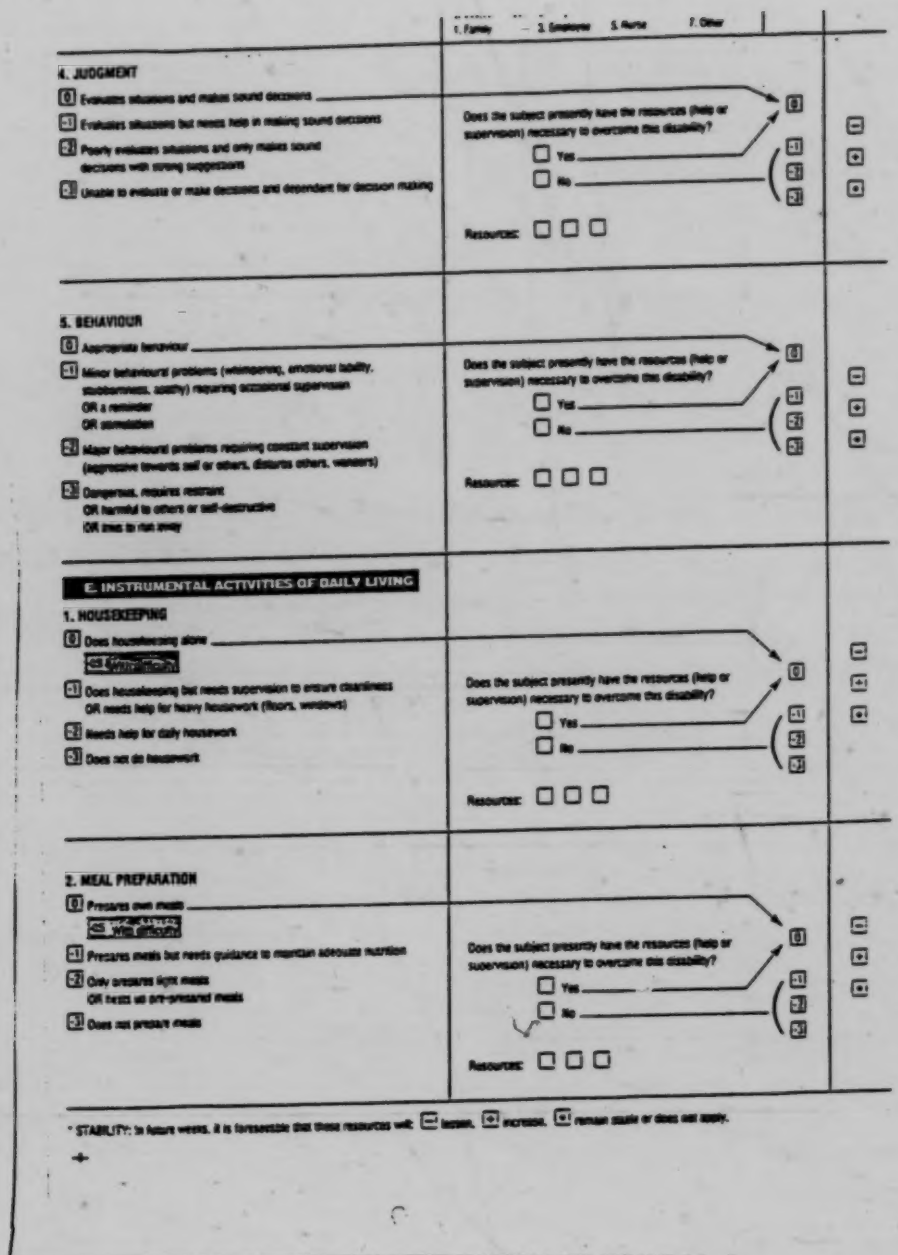
* STABILITY: In future weeks, it is foreseeable that these resources will: ⊟ lessen, ⊞ increase, ⊡ remain stable or does not apply.

->


1. Family
3. Employer
5. Home
7. Other
5. PROPELLING A WHEELCHAIR (W/C)
0 Does not need a wheelchair
-1 Propels wheelchair independently
-2 Needs to have wheelchair pushed
-3 Unable to use wheelchair (must be transported on stretcher)
standard wheelchair
wheelchair with unilateral use
motorized wheelchair
Does the subject's usual residence allow for:
W/C accessibility
W/C mobility
Yes
No
Does the subject presently have the resources (help or supervision) necessary to overcome this disability?
Yes
No
Resources:
6. NEGOTIATING STAIRS
0 Goes up and down stairs alone
-1 Requires cueing, supervision or guidance to negotiate stairs OR does not safely negotiate stairs
-2 Needs help to go up and down stairs
-3 Does not negotiate stairs
Does the subject have to negotiate stairs?
No
Yes
Does the subject presently have the resources (help or supervision) necessary to overcome this disability?
Yes
No
Resources:
C. COMMUNICATION
1. VISION
0 Sees adequately with or without corrective lenses
-1 Visual problems but sees enough to do ADLs
-2 Only sees outlines of objects and needs supervision in ADLs
-3 Blind
corrective lenses
magnifying glass
Does the subject presently have the resources (help or supervision) necessary to overcome this disability?
Yes
No
Resources:
2. HEARING
0 Hears adequately with or without hearing aid
-1 Hears if spoken to in a loud voice OR needs hearing aid put in by another person
-2 Only hears shouting or certain words OR reads lips OR understands gestures
-3 Deaf and unable to understand what is said to another
hearing aid
Does the subject presently have the resources (help or supervision) necessary to overcome this disability?
Yes
No
Resources:

* STABILITY: in future weeks, it is foreseeable that these resources will: ⊟ lessen, ⊕ increase, ⊙ remain stable or case not apply.


1. Family
3. Employer
5. Marital
7. Other
3. SPEAKING
0 Communicates verbally in prevailing language and is easily understood
-1 Has a speech/language problem but able to express him/herself
-2 Has a major speech/language problem but able to express basic needs OR answer simple questions
-3 Unable to communicate verbally
Does the subject presently have the resources (help or supervision) necessary to overcome this disability?
Yes
No
Resources:
D. MENTAL FUNCTIONS
1. MEMORY
0 Normal memory
-1 Minor recent memory deficit (names, appointments...) but remembers important events
-2 Serious memory lapses (shut off stove, medications, putting away things, eating, visitors)
-3 Almost total memory loss or amnesia
Does the subject presently have the resources (help or supervision) necessary to overcome this disability?
Yes
No
Resources:
2. ORIENTATION
0 Oriented to time, place and persons
-1 Sometimes disoriented to time, place and persons
-2 Only oriented for immediate events (i.e., time of day) and in the usual living environment and with familiar persons
-3 Complete disorientation
Does the subject presently have the resources (help or supervision) necessary to overcome this disability?
Yes
No
Resources:
3. COMPREHENSION
0 Understands instructions and requests
-1 Slow to understand instructions and requests
-2 Partial understanding even after repeated instructions
-3 Unaware of what goes on around him/her
Does the subject presently have the resources (help or supervision) necessary to overcome this disability?
Yes
No
Resources:
* STABILITY: In future weeks, it is foreseeable that these resources will: - lessen, + increase, = remain stable or does not apply.



1. Family 3. Employer 5. Nurse 7. Other

4. JUDGMENT

0 Evaluates situations and makes sound decisions

-1 Evaluates situations but needs help in making sound decisions

-2 Poorly evaluates situations and only makes sound decisions with strong suggestions

-3 Unable to evaluate or make decisions and dependent for decision making

Does the subject presently have the resources (help or supervision) necessary to overcome this disability?

☐ Yes → 0

☐ No → -1 / -2 / -3

Resources: ☐☐☐

⊟ ⊡ ⊡

5. BEHAVIOUR

0 Appropriate behaviour

-1 Minor behavioural problems (whimpering, emotional lability, stubbornness, apathy) requiring occasional supervision OR a reminder OR stimulation

-2 Major behavioural problems requiring constant supervision (aggressive towards self or others, disturbs others, wanders)

-3 Dangerous, requires restraint OR harmful to others or self-destructive OR tries to run away

Does the subject presently have the resources (help or supervision) necessary to overcome this disability?

☐ Yes → 0

☐ No → -1 / -2 / -3

Resources: ☐☐☐

⊟ ⊡ ⊡

E. INSTRUMENTAL ACTIVITIES OF DAILY LIVING

1. HOUSEKEEPING

0 Does housekeeping alone

[illegible]

-1 Does housekeeping but needs supervision to ensure cleanliness OR needs help for heavy housework (floors, windows)

-2 Needs help for daily housework

-3 Does not do housework

Does the subject presently have the resources (help or supervision) necessary to overcome this disability?

☐ Yes → 0

☐ No → -1 / -2 / -3

Resources: ☐☐☐

⊟ ⊡ ⊡

2. MEAL PREPARATION

0 Prepares own meals

[illegible]

-1 Prepares meals but needs guidance to maintain adequate nutrition

-2 Only prepares light meals OR heats up pre-prepared meals

-3 Does not prepare meals

Does the subject presently have the resources (help or supervision) necessary to overcome this disability?

☐ Yes → 0

☐ No → -1 / -2 / -3

Resources: ☐☐☐

⊟ ⊡ ⊡

* STABILITY: In future weeks, it is foreseeable that these resources will: ⊟ lessen, ⊡ increase, ⊡ remain stable or does not apply.

	1. Family	3. Employer	5. Home	7. Other	
3. SHOPPING 0 Plans and does shopping independently (food, clothes) [redacted] 1 Shops but needs delivery service 2 Needs help to plan or shop 3 Does not shop	Does the subject presently have the resources (help or supervision) necessary to overcome this disability? ☐ Yes → 0 ☐ No → 1 / 2 / 3 Resources: ☐ ☐ ☐				⊖ ⊙ ⊙
4. LAUNDRY 0 Does laundry independently [redacted] 1 Does laundry but needs guidance or stimulation to maintain standards of cleanliness 2 Needs help to do laundry 3 Does not do laundry	Does the subject presently have the resources (help or supervision) necessary to overcome this disability? ☐ Yes → 0 ☐ No → 1 / 2 / 3 Resources: ☐ ☐ ☐				⊖ ⊙ ⊙
5. TELEPHONE 0 Uses telephone (including use of directory) [redacted] 1 Answers telephone but only dials a few memorized numbers or emergency numbers 2 Communicates by telephone but does not dial numbers or lift the receiver off the hook 3 Does not use the telephone	Does the subject presently have the resources (help or supervision) necessary to overcome this disability? ☐ Yes → 0 ☐ No → 1 / 2 / 3 Resources: ☐ ☐ ☐				⊖ ⊙ ⊙
6. TRANSPORTATION 0 Able to use transportation alone (car, taxi, bus...) [redacted] 1 Must be accompanied to use transportation OR uses an adapted vehicle 2 Uses car or adapted vehicle only if accompanied and has help getting in and out of the vehicle 3 Must be transported in an ambulance	Does the subject presently have the resources (help or supervision) necessary to overcome this disability? ☐ Yes → 0 ☐ No → 1 / 2 / 3 Resources: ☐ ☐ ☐				⊖ ⊙ ⊙

* STABILITY: In future weeks, it is foreseeable that these resources will: ⊖ lessen, ⊕ increase, ⊙ remain stable or does not apply.

	1. Family	3. Employee	5. Nurse	7. Other	
7. MEDICATION USE					
0 Takes medication according to prescription OR does not need medication					
[illegible]					
1 Needs weekly supervision to ensure compliance to prescription OR uses a medication dispenser aid	Does the subject presently have the resources (help or supervision) necessary to overcome this disability? ☐ Yes ☐ No			0 -1 -3	⊖ ⊙ ⊙
2 Takes medication if prepared daily					
3 Must be given each dosage of medications (as prescribed)					
☐ medication dispenser aid	Resources: ☐ ☐ ☐				
8. BUDGETING					
0 Manages budget independently					
[illegible]					
-1 Needs supervision for certain major transactions	Does the subject presently have the resources (help or supervision) necessary to overcome this disability? ☐ Yes ☐ No			0 -1 -3	⊖ ⊙ ⊙
-2 Needs help for some regular transactions (cashing checks, paying bills)					
-3 Does not manage budget	Resources: ☐ ☐ ☐				

* STABILITY: In future weeks, it is foreseeable that these resources will: ⊖ lessen, ⊕ increase, ⊙ remain stable or does not apply.

SMAF has been developed and validated with a grant from the *Conseil québécois de la recherche sociale* and the *Département de santé communautaire* of Hôtel-Dieu de Lévis Hospital.

To order copies of this form (specify english or french), please write to:

Système de Mesure de l'Autonomie Fonctionnelle
Hôpital d'Youville
1030, Belvédère Sud
Sherbrooke (Québec) Canada
J1H 4C4

APPENDIX F. MODIFIED BARTHEL INDEX

Personal hygiene

1.	Unable to attend to personal hygiene, and is dependent in all aspects.	0
2.	Assistance is required in 1 or more steps of personal hygiene	1
3.	Some assistance is required in 1 or more steps of personal hygiene	3
4.	Able to conduct his/her own personal hygiene, but requires minimal assistance before or after the activity	4
5.	Can wash his/her hands & face, comb hair, clean teeth & shave. A male may use any kind of razor but must retrieve and insert blade, or plug in without help. A female must apply own makeup, but need not braid or style own hair.	5

Bathing self

1.	Total dependence in bathing self	0
2.	Assistance is required with all aspects of bathing	1
3.	Assistance is required with either transfer to shower/bath, or washing or drying includes inability to complete a task because of condition/disease.	3
4.	Supervision is required for safety in adjusting water temperature or in transfer	4
5.	May use bath tub or shower, or take a complete sponge bath. Able to do all the steps of any method employed without another person present.	5

Feeding

1.	Dependent in all aspects and needs to be fed.	0
2.	Can manipulate an eating device (eg. spoon), but someone provides active assistance during the meal	2
3.	Can feed self with supervision. Assistance is required with putting milk/sugar into tea, salt/pepper, spread butter, turn plat or 'other' set-up activities.	5
4.	Independent in feeding with a prepared tray (meat cut, open milk, jar lid). Another person not required.	8
5.	Feed self independently from a tray or table when someone puts the food within reach. Must put on assistive devices of needed, cut the food and if desired, use salt & pepper, spread butter etc.	10

On & Off the toilet

1.	Fully dependent in toiletting	0
2.	Assistance required in all aspects of toiletting	2
3.	Assistance may be required with management of clothing, transferring or washing hands	5
4.	Supervision required for safety with normal toilet. Commode use at night with assistance to empty and clean	8
5.	Able to get on/off the toilet, unfasten/fasten, prevent soiling of clothes, & use toilet paper without help. If uses a bedpan, urinal or commode at night must be able to empty & clean independently	10

Stairs - one flight

1.	Unable to climb stairs	0
2.	Assistance is required in all aspects of stair climbing, including assistance with walking aids	2

3. Able to ascend/descend, but unable to carry walking aids & needs supervision/assistance 5
4. Generally no assistance required. At times supervision required for safety due to morning stiffness/SOB 8
5. Able to go up and down one flight of stairs safely without help or supervision. Able to use hand rails, cane, crutches when needed, & able to carry these devices as ascend/descend 10

Stairs - more than one flight of stairs

Dressing

1. Dependent in all aspects of dressing & unable to participate in the activity 0
2. Able to participate to some degree, but is dependent in all aspects of dressing 2
3. Assistance is needed in putting on, and/or removing any clothing 5
4. Only minimal assistance is required with fastening clothing such as buttons, zips, bra, shoes, etc. 8
5. Able to put on, remove and fasten clothing, tie shoelaces, or put on, fasten and remove corset, braces as prescribed. 10

Bowels

1. Is bowel incontinent 0
2. Needs help to assume appropriate position & with bowel movement facilitatory techniques 2
3. Can assume appropriate position, but cannot use facilitatory techniques, or clean self without assistance and has frequent accidents. Assistance is required with incontinence aids such as pads 5
4. May require supervision with the use of a suppository or enema, and has occasional accidents 8
5. Can control bowels & has no accidents, can use suppository, or take an enema when necessary 10

Bladder

1. Is dependent in bladder management, is incontinent, or has an indwelling catheter 0
2. Is incontinent, but is able to assist with the application of an internal or external device 2
3. Is generally dry be day but not by night & needs some assistance with devices 5
4. Is generally dry by day & night, but may have an occasional accident, or need minimal assistance with devices 8
5. Is able to control bladder by day & night, and/or is independent with external/internal devices 10

Chair/bed transfer

1. Unable to participate in a transfer, 2 attendants required to transfer patient with/without a mechanical device 0
2. Able to participate but maximal assist of 1 other person is required in any aspect of the transfer 3
3. Transfer requires the assistance of one other person. Assistance may be required in any aspect of the transfer 8
4. Presence of an other person is required either as a confidence measure, or to provide supervision for safety 12
5. Can safely approach the bed in a wheelchair, lock the brakes, lift the footpedals, move safely to the bed, lie down,come to a sitting position on the side of the bed, change the position of the wheelchair, transfer back into it safely.Patient must be independent in all phases of this activity 15

Ambulation

1.	Dependent in ambulation	0
2.	Constant presence of one or more assistants is required during ambulation	3
3.	Assistance is required for reaching aids and/or their manipulation. 1 person is required to offer assistance	8
4.	Is independent in ambulation, but unable to walk 50 meters without help, or supervision is needed for confidence or safety in hazardous situations	12
5.	Able to wear braces if required, lock and unlock these braces, assume standing position, sit down, & place the necessary aids into position for use. The patient must be able to use crutches, cane or a walker, & walk 50 meters without help or supervision.	15

Wheelchair Management

1.	Dependent in wheelchair locomotion	0
2.	Can propel self short distances on flat surface, but assistance required for all other aspects of wheelchair management	1
3.	Presence of one person is necessary & constant assistance is required to manipulate wheelchair to the table, bed, etc,	3
4.	Can propel self for a reasonable duration over regularly encountered terrain. Minimum assistance may still be required in 'tight' corners.	4
5.	To propel wheelchair independently, patient able to go around corners, turn around, maneuver wheelchair to a table, bed, toilet, etc, Patient able to push wheelchair at least 50 meters	5

Total _____

Initials _____

Date _____

APPENDIX G. THE TIMED UP & GO

Equipment and General Directions

1. Chair: The chair should have arms, a firm seat and back. The seat should support the length of the thigh and should be high enough from the ground so that the individual's feet rest comfortably on the floor.
2. Tape Measure: Measure three meters from the front chair legs.
3. Tape: Place a 1 meter piece of tape on the tiled floor to mark the turn line. The tape should be visible.
4. The subject should wear their normal footwear. Allow one practice session so it is clear that they understand the procedure.
5. Stopwatch: Timing begins on the word "go" and ends when the subject returns to the start position with his/her back against the chair. If the subject uses a walking aid, note the type and what gait pattern is used (eg. step-to or step-through).

Instructions to the Subject (Given in stages)

I will now measure how long it takes you to walk.

Sit in this chair with your back against the chair and your arms resting on the chair arms.

When I say "Go" stand up and walk ***at your normal speed*** to the line on the floor. Turn around, return to the chair and sit down.

Go.[25]

APPENDIX H. THE BERG BALANCE SCALE

Grading: Please mark the lowest category which applies

1. SITTING TO STANDING

Instructions: Please stand up. Try not to use your hands for support.

( ) 4	( ) 3	( ) 2	( ) 1	( ) 0
able to stand no hands and stabilize indep.	able to stand independ. using hands	able to stand using hands after several tries	needs minimal assist to stand or to stabilize	needs moderate max. assist to stand

2. STANDING UNSUPPORTED

Instructions: Please stand for 2 minutes without holding.

( ) 4	( ) 3	( ) 2	( ) 1	( ) 0
able to stand safely for 2 minutes.	able to stand 2 minutes with supervision	able to stand 30 seconds unsupported	needs several tries to stand 30 seconds unsupported	unable to stand 30 seconds unassisted

3. SITTING WITH BACK UNSUPPORTED, BUT FEET SUPPORTED ON FLOOR OR ON A STOOL

Instructions: Please sit with arms folded for 2 minutes.

( ) 4	( ) 3	( ) 2	( ) 1	( ) 0
able to sit safely and securely for 2 minutes	able to sit 2 min. under supervision	able to sit 30 seconds	able to sit 10 seconds	unable to sit without support for 10 seconds

4. STANDING TO SITTING

Instructions: Please sit down.

( ) 4	( ) 3	( ) 2	( ) 1	( ) 0
sits safely with minimal use of hands	controls descent by using hands	uses back of legs against chair to control descent	sits independ. but has uncontrolled descent	needs assistance

5. TRANSFERS

Instructions: Arrange chair(s) for a pivot transfer. Ask subject to move one way toward a seat with armrests and one way toward a seat without armrests. You may use two chairs (one with and one without armrests) or a bed and a chair.

( ) 4	( ) 3	( ) 2	( ) 1	( ) 0
able to transfer safely with minor use of hands	able to transfer safely with definite need of hands	able to transfer with verbal cueing and/or supervision	needs 1 person assist	needs 2 people to assist or supervise to be safe

6. STANDING UNSUPPPORTED WITH EYES CLOSED

Instructions: Please close your eyes and stand still for 10 seconds.

( ) 4	( ) 3	( ) 2	( ) 1	( ) 0
able to stand 10 seconds safely	able to stand 10 seconds with supervision	able to stand 3 seconds	unable to keep eyes closed 3 seconds but stays steady	needs help to keep from falling

7. STANDING UNSUPPORTED WITH FEET TOGETHER

Instructions: Place your feet together and stand without holding.

( ) 4	( ) 3	( ) 2	( ) 1	( ) 0
Able to place feet together independ. and stand 1 minute safely	able to place feet together independ. and stand 1 minute with supervision	able to place feet together independ. but unable to hold 30 seconds	needs help to attain position but able to stand 15 seconds with feet together	needs help to position and to hold 15 seconds

8. REACHING FORWARD

Instructions: Lift arm to 90°. Stretch out your fingers and reach forward as far as you can. (Examiner places a ruler at end of fingertips when the arm is at 90. Fingers should not touch the ruler while reaching forward. The recorded measure is the distance forward that the fingers reach while the subject is in the most forward lean position. When possible ask for the reach with both arms to avoid trunk rotation.)

( ) 4	( ) 3	( ) 2	( ) 1	( ) 0
can reach forward confidently > 10 in.	can reach forward > 5 in. safely	can reach forward > 2 in. safely	reaches forward but needs supervision	loses balance while trying (requires external support)

9. PICK UP OBJECT FROM FLOOR FROM A STANDING POSITION

Instructions: Pick up the shoe or slipper which is placed in front of your feet.

( ) 4	( ) 3	( ) 2	( ) 1	( ) 0
able to pick up shoe safely and easily	able to pick up shoe but needs supervision	unable to pick up reaches 1-2" from shoe & keeps balance independ.	unable to pick up & needs supervision while trying	unable to pick up & needs help to keep from falling

10. TURNING TO LOOK BEHIND OVER LEFT & RIGHT SHOULDER WHILE STANDING

Instructions: Turn to look directly behind you over your left shoulder. Repeat to the right. (Examiner may pick an object to look at directly behind the subject to encourage a better twist turn.)

( ) 4	( ) 3	( ) 2	( ) 1	( ) 0
looks behind to both sides and weight shifts well	looks behind to one side only, other side shows less weight shift	turns sideways only but maintains balance	needs supervision when turning	needs assistance to keep from falling

11. TURN 360 DEGREES

Instructions: Turn completely around in a full circle. (Pause) Then turn in a full circle in the other direction.

( ) 4	( ) 3	( ) 2	( ) 1	( ) 0
able to turn 360° safely to each side in <4 sec.	able to turn 360° to one side only < 4 sec.	able to turn 360° safely but slowly	needs close supervision or verbal cueing	needs assistance while turning

12. PLACING ALTERNATE FOOT ON STEP OR STOOL WHILE STANDING UNSUPPORTED

Instructions: Place each foot alternately on the step/stool. Continue until each foot has touched the step/stool four times.

( ) 4	( ) 3	( ) 2	( ) 1	( ) 0
able to stand independ. & safely and complete 8 steps in 20 seconds	able to stand independ. and complete 8 steps in 20 seconds	able to complete 4 steps without aid but with supervision	able to complete > 2 steps and needs some physical assist	needs help to keep from falling or unable to try

13. STANDING UNSUPPORTED ON FOOT IN FRONT

Instructions: (Demonstrate to subject) Place one foot directly in front of the other foot. If you feel that you cannot place your foot directly in front, try to step far enough ahead so that the heel of your forward foot is ahead of the toes of the other foot. (To score 3 points, the length of the step should exceed the length of the other foot and the width of the stance should approximate the subject's normal stance width.)

( ) 4	( ) 3	( ) 2	( ) 1	( ) 0
able to place foot tandem independ. and hold 30 seconds	able to place foot ahead of other independ. and hold 30 seconds	able to take small step and hold 30 sec.	needs help to step but can hold 15 sec.	loses balance while stepping or standing

14. STANDING ON ONE LEG

Instructions: Stand on one foot as long as you can without holding.

( ) 4	( ) 3	( ) 2	( ) 1	( ) 0
able to lift leg independ. and hold > 10 seconds	able to lift leg independ. and hold 5-10 seconds	able to lift leg independ. and hold = or > 3 sec.	tries to lift leg, unable to hold 3 sec. but remains	unable to try needs assist

FINAL SCORE: _____/56 Date _____ Signature _____

APPENDIX I. RELIABILITY OF THE OUTCOME MEASURES

Table I.1 Raw Data for SMAF Intra-rater Reliability: Rater 1

SMAF D Time 1	SMAF D Time 2	SMAF H Time 1	SMAF H Time 2	SMAF H Time2-1
-20.0	-18.0	-2.0	0.0	2.0
-30.0	-29.0	0.0	-2.0	2.0
-28.0	-21.5	0.0	0.0	0.0
-31.0	-25.5	0.0	0.0	0.0
-38.0	-35.5	0.0	0.0	0.0
-21.0	-20.0	0.0	0.0	0.0
-20.0	-19.0	-4.0	0.0	4.0
-29.5	-27.5	0.0	0.0	0.0
-20.0	-18.5	0.0	0.0	0.0
-12.5	- 9.0	0.0	0.0	0.0

Table I.2 Raw Data for the BI, BBS and TUG Intra-rater Reliability: Rater 2

BI Time 1	BI Time 2	TUG Time 1	TUG Time 2	Berg Time 1	Berg Time 2
88.0	85.0	24.8	29.5	28.0	41.0
87.0	92.0	21.3	17.6	16.0	16.0
100.0	100.0	14.3	15.9	44.0	44.0
99.0	98.0	9.8	9.9	55.0	56.0
100.0	100.0	9.3	9.7	52.0	53.0
89.0	91.0	18.4	18.3	35.0	45.0
96.0	91.0	15.8	14.1	45.0	47.0
90.0	91.0	31.0	28.6	33.0	32.0
91.0	89.0	33.6	29.5	32.0	32.0
83.0	83.0	45.9	38.4	37.0	34.0

An ICC (1,1) was calculated for the SMAF D, BI, TUG and BBS using the formula:

$$ICC(1,1) = \frac{BMS - WMS}{BMS + (k - 1)\,WMS}$$

Values for the components of the formula were taken from the reliability analyses as shown in Table 4.3 for the SMAF D, in 4.4 for the BI, in 4.5 for the BBS and in 4.6 for the TUG.

Table I.3 Reliability Analysis (ANOVA) of the SMAF D

Source of Variation	SS	df	MS	F	p
Between Subjects	972.51	9	108.06		
Within Subjects	52.12	10	5.21		
Between Measures	35.11	1	35.11	**18.58**	**.00**
Residual	17.01	9	1.89		
Total	1024.64	19	53.93		
Grand Mean	-23.68				

Table I.4 Reliability Analysis (ANOVA) of the Barthel Index

Source of Variation	SS	df	MS	F	p
Between People	600.05	9	66.67		
Within People	34.50	10	3.45		
Between Measures	.45	1	3.78	.12	.74
Residual	34.05	9	3.78		
Total	634.55	19	33.39		
Grand Mean	92.15				

Table I.5 Reliability Analysis (ANOVA) of the Berg Balance Scale

Source of Variation	SS	df	MS	F	p
Between People	2364.05	9	262.67		
Within People	142.50	10	14.25		
Between Measures	26.45	1	26.45	2.05	.19
Residual	116.05	9	12.89		
Total	2506.55	19	131.92		
Grand Mean	35.85				

Table I.6 Reliability Analysis (ANOVA) of the Timed Up and Go

Source of Variation	SS	df	MS	F	p
Between People	2011.83	9	223.54		
Within People	60.05	10	6.01		
Between Measures	8.08	1	8.08	1.40	.27
Residual	51.98	9	5.78		
Total	2071.88	19	109.05		
Grand Mean	21.79				

APPENDIX J. LETTER OF APPROVAL FROM THE RESEARCH ETHICS BOARD

Capital Health

Regional Research Administration Office
CSB 9-122, 492-1372

Memorandum

NOTICE OF APPROVAL FOR PROPOSED RESEARCH
HOME CARE

Project Title:	The Construct Validity of the Functional Autonomy Measurement System (SMAF) for the Older Adult on Home Care
Project No.:	E-13
Investigator(s):	Kari Elliott
Department:	Edmonton Home Care
Division:	-
Address:	Misericordia Community Health Centre 8th Floor, 16940 - 87 Avenue T5R 4H5
Phone/FAX:	496-8445 / 944-4424

Supporting documents:

1)	Ethical Approval	November 1997
2)	Study Protocol	Received
3)	Funds:a) Source b) Type	Faculty of Rehabilitation Research Assistantship Grant
4)	Overhead Negotiated	N/A
5)	Account #	Unknown
6)	Contract	N/A

Project Approved December 1997

THIS APPROVAL IS VALID FOR ONE YEAR

By

Title Maureen Bain, Manager
Regional Research Administration

Copies to Department Chair/Health Sciences Faculty
Vicky Afacan, Acting Corporate Controller
Phil Heuchert, Manager Trust & Research Accounts

December 10, 1997

University of Alberta
Edmonton
Canada T6G 2G4

Faculty of Rehabilitation Medicine
Rehabilitation Research Centre
3-48 Corbett Hall
Director (403) 492-7856 Telephone (403) 492-2903
Fax (403) 492-1626

UNIVERSITY OF ALBERTA HEALTH SCIENCES FACULTIES, CAPITAL HEALTH AUTHORITY, AND CARITAS HEALTH GROUP

HEALTH RESEARCH ETHICS APPROVAL

Date: November, 1997

Name(s) of Principal Investigator(s): Kari Elliott

Organization(s): University of Alberta

Department: Department of Physical Therapy, Faculty of Rehabilitation Medicine

Project Title: The Construct Validity of the Functional Autonomy Measurement System (SMAF) for the Older Adult on Home Care

The Health Research Ethics Board has reviewed the protocol for this project and found it to be acceptable within the limitations of human experimentation. The HREB has also reviewed and approved the patient information material and consent form.

The approval for the study as presented is valid for one year. It may be extended following the completion of a progress report form which will be sent to you in a year's time. Any proposed chnages to the study must be submitted to the Health Research Ethics Board for approval.

APPENDIX K. HOME CARE CONSENT

Capital Health

COMMUNITY CARE
AND PUBLIC HEALTH

November 17, 1997

Kari Elliott
17630-96 Avenue
Edmonton, AB
T5T 6C2

Dear Kari:

Thank you for the opportunity to meet with you in person regarding your thesis proposal.

I am pleased to inform you that your thesis has been granted administrative approval to proceed in the Home Care Program.

The timelines for this study are from January 1st until January 31st, 1998, inclusive. The study would involved thirty-six (36) Home Care Clients in total.

Please contact me if any additional information is required.

Respectfully,

Gloria Mohr
Director, Home Care

cc S. Paul
A. Semotiuk
M. Bain

Community Care and Public Health
#402, 10216 – 124 Street
Edmonton, Alberta, Canada
T5N 4A3

Phone 403) 413-7660
Fax 403) 488-3401

96

Capital Health Authority

COMMUNITY HEALTH
Home Care

August 8, 1997

Physiotherapy Foundation of Canada
Suite 410, 2345 Yonge Street
TORONTO, Ontario
M5P 2ES

To Whom it May Concern:

Re: Kari Elliott's Application for the Fellowship in Gerontology

This is to advise you of our support in principal, pending our own review and approval of the research proposal by Kari Elliott of "The Construct Validity of the Functional Autonomy Measurement System". We look forward to the process and the results of the research.

Sincerely,

Ann Semotiuk
Home Care Manager, Southwest Network

AS:aik

Misericordia Community Health Centre
8th Floor, 16940 - 87 Avenue
Edmonton, Alberta
Canada T5R 4H5

Tel: (403) 496-8445
Fax: (403) 944-4424

APPENDIX L. LETTER OF PERMISSION FROM DR. HEBERT

SECRETARIAT
13-08-19

Kari Elliott B Sc P T
Home Care
Misericordia Community Health Centre
8th Floor, 16940 - 87 Ave.
Edmonton, Alberta
T5R 4H5

Dr. Hébert
Centre de recherche en gérontologie et geriatrie,
Hôpital d'Youville, 1036 Belvédère Sud,
Sherbrooke, Quebec
J1H 4C4

Dear Dr Hebert,

I am a physical therapist with a strong background in geriatrics and an interest in outcome measurement of the community-dwelling elderly. I would like your permission to trial the Functional Autonomy Measurement System on clients admitted to Edmonton Home Care.

Please advise at your earliest convenience.

Sincerely,

K Elliott

Kari Elliott

Dear Dr Elliott,

Thank you for your interest in the SMAF. You have my permission to use it for your trial. Please find enclosed a copy of the instrument.

Sincerely yours

APPENDIX M. STATISTICAL ANALYSES SUPPLEMENT

Table M.1 ANOVA Analysis of the Ability to Predict SMAF H from Disability and Hours of Service

Model	SS	df	MS	F	p value
Regression	3.49	2	1.75	.78	.47
Residual	73.73	33	2.23		
Total	77.22	35			

Table M.2 Coefficients of Regression for the SMAF D and the Hours of Formal Service

	Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for B	
Model	B	Std. Error	Beta	t	p	Lower Bound	Upper Bound
(Constant)	5.93E-02	.77		.08	.94	-1.51	1.63
SMAFD	2.69E-02	.03	.15	.84	.41	-0.04	.09
Paid Serv.	-5.30E-02	.07	-.14	-.79	.44	-0.19	.08

APPENDIX N. RAW DATA

Table N.1 Southwest Home Care Sample Data

Subject	Age	Gender	SMAF D	SMAF H	BI	BBS	TUG	Paid	Prog.
1	86	2	-22.0	-1	85	30	28.70	4.00	2
2	76	2	-22.0	0	88	52	15.28	9.00	2
3	79	2	-21.5	0	89	32	29.48	9.50	2
4	82	2	-18.0	0	91	33	21.93	0	1
5	90	2	-9.0	0	96	39	23.03	0	2
6	91	2	-12.5	-4	91	47	14.11	3.50	2
7	87	2	-21.0	0	80	37	33.90	1.00	1
8	70	1	-23.5	-2	83	33	38.41	6.00	2
9	79	2	-15.5	0	92	16	17.58	3.00	2
10	69	2	-9.0	0	100	44	15.93	0	2
11	81	2	-16.0	0	79	15	56.00	0	1
12	86	1	-28.0	0	84	29	20.70	0.50	2
13	87	2	-28.0	0	73	27	29.91	1.00	1
14	90	2	-17.5	0	91	31	33.78	6.00	2
15	81	2	-31.0	-3	91	32	28.62	6.00	2
16	67	2	-37.0	0	74	10	59.00	4.00	1
17	84	2	-29.0	0	85	28	39.00	5.75	1
18	68	1	-25.0	0	72	22	16.99	6.25	2
19	78	2	-19.0	0	84	36	54.98	3.50	2
20	76	2	-17.5	0	96	31	23.00	0	1
21	80	2	-23.0	0	86	28	34.43	0	2
22	62	2	-13.5	0	96	45	19.44	0	2
23	67	1	-13.5	0	100	53	14.07	0	2
24	76	2	-19.0	0	84	29	25.25	2.00	1
25	75	1	-31.5	-3	97	42	26.63	0	1
26	87	2	-28.0	0	100	41	15.98	0	2
27	82	2	-30.0	0	80	25	46.75	0	1
28	78	2	-32.0	0	89	36	29.45	1.50	2
29	89	2	-38.0	0	83	38	33.59	0	2
30	92	2	-24.5	0	91	36	19.87	14.00	2
31	91	1	-30.5	-6	95	40	22.96	0.75	1
32	71	2	-21.5	-4	83	35	22.32	9.00	2
33	84	2	-31.0	0	79	32	29.76	4.00	2
34	81	2	-5.5	0	100	49	10.83	0	2
35	74	1	-31.0	-1	86	30	22.94	0.50	2
36	80	2	-28.0	-2	82	32	48.19	11.50	2

Key for the Southwest Home Care Sample Data Code

Age: (years)
Gender: 1 = male, 2=female
TUG: time in seconds
Paid: Paid formal service provision in hours
Prog.: 1 = STIT, 2 = LTC

Table N.2 ANOVA Summary Table for Age in the Three Samples

	SS	df	MS	F	p
Between Groups	334.65	2	167.33	2.07	.13
Within Groups	8316.00	103	80.74		
Total	8650.65	105			

Table N.3 ANOVA Summary Table for Paid Formal Service (Hours) in the Three Samples

	SS	df	MS	F	p
Between Groups	28.65	2	14.33	1.10	.34
Within Groups	1362.63	105	12.98		
Total	1391.28	107			

Table N.4 Chi-Square Analysis for Demographics in the Three Samples

Variable	Sample Group			Chi Square	p
	Study	New	All		
Gender				5.24	.07
Females	29	20	25		
Males	7	16	11		
Program				2.76	.25
LTC	25	30	30		
STIT	11	6	6		
Diagnosis					
Cardiovascular	24	11	8	**16.77**	**.00**
Musculoskeletal	18	18	17	.07	.96
Pulmonary	8	6	4	1.60	.45
Diabetes	8	4	1	**6.47**	**.04**
Cancer	28	34	32	4.60	.10
Neurological	13	11	8	1.69	.43
Residential Type*				1.42	.49
Private	24	24	28		
Supported Living	12	12	8		
Lives With*				.99	.61
Alone	19	20	23		
With Others	17	16	13		

* These factors had to be recoded to meet the underlying assumption of at least 5 cases per cell for Chi Square analysis.